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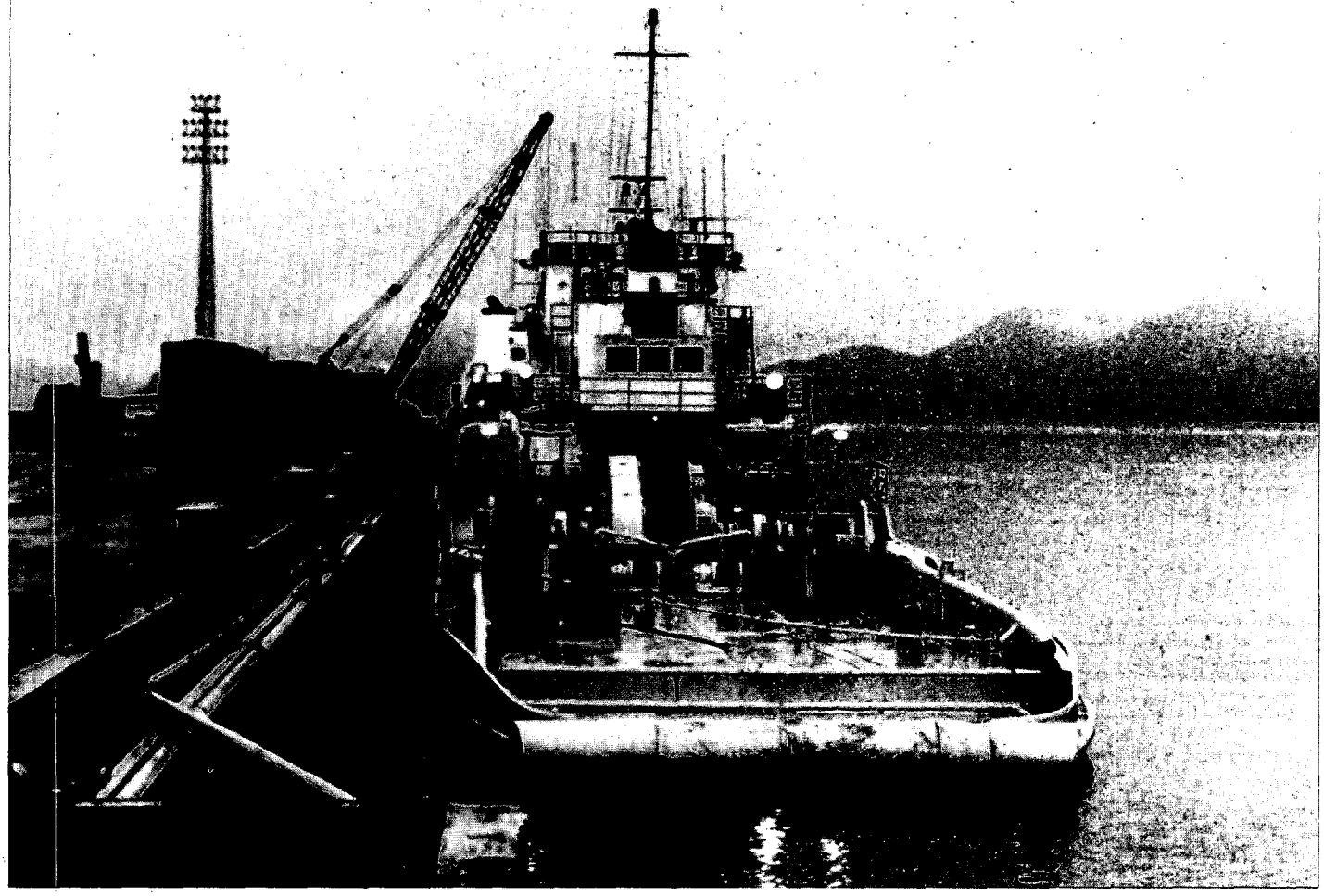
ONSHORE IMPACTS OF OFFSHORE OIL:

A USER'S GUIDE TO ASSESSMENT METHODS



UNITED STATES DEPARTMENT
OF THE INTERIOR

May 1979

ONSHORE IMPACTS OF OFFSHORE OIL:

A USER'S GUIDE TO ASSESSMENT METHODS

Prepared for
Department of the Interior
Office of Policy Analysis

Under Contract by
David C. Williams
and Kathleen B. Hom

May 1979

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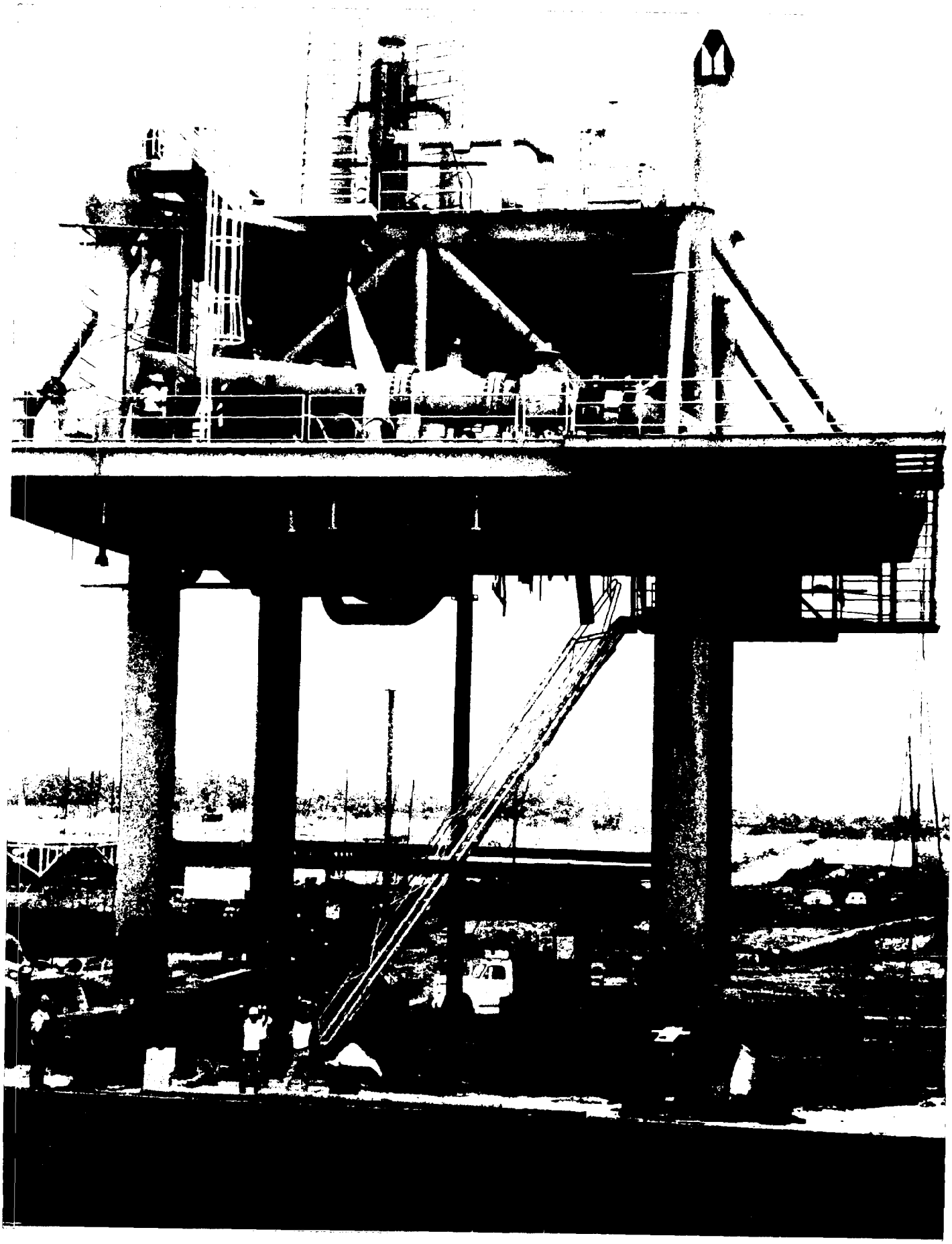

FOREWORD

One of my major goals at the Department of the Interior is to assure a successful program for development of the energy resources of our Outer Continental Shelf. Success depends both on industry's ability to find and extract whatever oil and gas may exist and on the cooperative efforts of all levels of government to assure environmentally sound, expeditious development of these valuable resources.

Since taking office, my policy has been to provide opportunities for greater involvement by State and local agencies in the critical early phases of our planning for OCS leasing. Also, to assist in preparing for the subsequent onshore effects of offshore development, Interior has supported the preparation of three specialized assessment and planning methods. With these and other available analytical tools, State and local governments can assess and plan for the potential onshore facilities and activities as well as estimate their effects on population growth, employment, taxes, land use and environmental quality. As all of us in the public sector become more knowledgeable about the costs and benefits of OCS development, we can work together more effectively to achieve our national energy goals while preserving and enhancing the quality of life in our coastal communities.

In order to be comprehensive and sufficiently detailed, these methods are necessarily complex, voluminous and at first glance somewhat overwhelming. That's why we published this User's Guide. It is intended to help you understand and choose the planning and assessment tools which can be of most use for your particular situation. It not only describes and compares the individual methods, but suggests combinations of parts of them which might be best suited to your available staff skills, funds, information needs, and lead time.

I hope you find the Guide and the methods helpful. If you need additional information, please contact our OCS Referral Center at 202/343-9314.

Cecil D. Andrus

CECIL D. ANDRUS
Secretary of the Interior

. . . we know from experience in the North Sea and elsewhere that the communities that benefitted most from OCS-related industrial development—or were damaged least—were those that tried early on to sketch out the broad outlines of what might occur and drew up contingency plans for protecting their interests and gaining their development objectives.

NERBC, *Methodologies for OCS-Related Facilities Planning*

This *User's Guide* was prepared under Contract No. 14-01-0001-78-C-05 for the Office of Policy Analysis, Office of the Secretary of Interior by David C. Williams and Kathleen B. Hom, management consultants, Washington, D.C.

Interior's Project Director was Paul R. Stang.

A special expression of appreciation goes to Ted Heintz, Office of Policy Analysis; Bill Nothdurft, NERBC; Phil Marcus, RALI, Ben Tencer, WESTON; Gordon Jacobs, NSF; Jeff Zinn, CF; and Larry Shanks, FWS, who provided information about the content and use of the principal planning and assessment methods and valuable suggestions for this *Guide*.

Funding for publication of this document was provided by the Department of Commerce's Office of Coastal Zone Management and the Department of the Interior's Office of Policy Analysis, Bureau of Land Management, U. S. Fish and Wildlife Service, and U. S. Geological Survey.

Additional copies of this document may be obtained from any of the following:

OCS Coordinator, RALI Program
U.S. Geological Survey, Mail Stop 750
USGS National Center, Reston, VA 22092

Information Transfer Specialist
National Coastal Ecosystem Team
U.S. Fish and Wildlife Service
NSTL Station, MS 39529

Coastal Zone Information Officer
Office of Coastal Zone Management
3300 Whitehaven Street, N.W.
Washington, D.C. 20235

OCS Referral Center, PBA
Department of the Interior
Washington, D.C. 20240

Regional OCS Offices of
the Bureau of Land Management,
Department of the Interior—

Alaska:
121 W. Fireweed Ln.
Anchorage, AK 99510

Pacific:
300 N. Los Angeles St.
Los Angeles, CA 90012

Gulf:
1001 Howard Ave.
New Orleans, LA 70113

Atlantic
90 Church St.
New York, NY 10007

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PRINCIPAL ONSHORE ASSESSMENT METHODS

This *User's Guide* discusses three principal methodologies for assessing and planning for the Onshore Impacts of Offshore Oil:

NERBC: ONSHORE FACILITIES RELATED TO OFFSHORE OIL AND GAS DEVELOPMENT

Prepared by the New England River Basins Commission (NERBC)
For the Resource and Land Investigations (RALI) Program, U.S. Geological Survey (USGS), Department of the Interior.
November 1976-June 1978

An excellent general approach to understanding OCS activities in a frontier area—aimed primarily at State planners and policy makers responsible for developing strategies for managing onshore development. Stresses understanding the assumptions involved in scenario development and the policy implications of siting analysis and decisions. Results in designating appropriate sites for facilities before specific proposals are made.

The key planning document is the third report, *Methodologies for OCS-Related Facilities Planning*, which presents methods for forecasting offshore activities and onshore facilities, and a framework for site analysis and impact assessment. Another document, the *Factbook*, is the definitive reference work to date on the characteristics and siting factors of the potential onshore facilities. *(See Chapter 2 of this User's Guide)**

WESTON: METHODOLOGY FOR ASSESSING ONSHORE IMPACTS OF OFFSHORE OUTER CONTINENTAL SHELF OIL AND GAS DEVELOPMENT

Prepared by Roy F. Weston, Inc.
For the National Science Foundation (NSF); Department of the Interior's Bureau of Land Management (BLM) with technical support from Office of Policy Analysis (OPA); and Office of Coastal Zone Management (OCZM), Department of Commerce. July 1978.

The most comprehensive of the assessment methods, WESTON builds on scenario development and siting analysis to assess the broad range of onshore impacts on a large area prior to actual development. It provides alternative methods of impact assessment, and is especially strong in covering socioeconomic impacts. Aimed primarily at State and multi-county regional planners.

The key document is Volume II—*Methodology*, which flows in logical progression from a development scenario to onshore impacts: Industry Requirements, Location Analysis, Economic Analysis, and Demographic, Fiscal and Environmental Impacts. *(See Chapter 3 of this User's Guide)**

CF: ENVIRONMENTAL PLANNING FOR OFFSHORE OIL AND GAS

Prepared by The Conservation Foundation (CF)
For the U.S. Fish and Wildlife Service (FWS), Office of Biological Services (OBS), Department of the Interior. March 1978.

Designed as a method for the assessment of environmental impacts of specific proposals. Aimed primarily at the field biologists of the Fish and Wildlife Service in meeting their statutory requirements in the OCS process; also useful for State and local planners, especially concerning environmental impacts. The most complete background information on the OCS process: offshore technology, Federal regulations, and the status of OCS oil and gas development in the five coastal regions. Especially good introduction to community effects of offshore activity.

The environmental assessment presented in Volume III—*Effects on Living Resources and Habitats* is the clearest and strongest available, providing for comprehensive assessment of specific facility proposals on specific sites. *(See Chapter 4* of this *User's Guide)**

NOTE: A complete list of the report volumes of the three principal assessment and planning methods is found on pages 66 and 67.
**Italics used throughout this Guide refer to chapters, sections and figures of the User's Guide.*

INTRODUCTION: Using the User's Guide

The United States Department of the Interior, as custodian of Federal lands, is leasing tracts on the nation's Outer Continental Shelf (OCS) in order to increase domestic production of oil and gas. This step-up in exploration, development and production of offshore petroleum resources is likely to affect, in one way or another, a number of States and communities along the Atlantic, Gulf of Mexico, Pacific and Alaska coasts.

The magnitude of the impact a State or community may experience depends upon many factors, including: the size, location and characteristics of the resources discovered; the size, economy and physical environment of the affected onshore area; and the quality and timeliness of planning responses. To respond effectively, State and local planners and policy makers need to:

- have a general understanding of the OCS development process, and know the best time to study, plan, and act;
- forecast the level of offshore activity and the likely resulting onshore facilities;
- define the scale, character and siting requirements of potential facilities;
- know the capability of potential onshore sites, and how to guide facilities to the most suitable sites:
- forecast the general impacts of OCS oil and gas development prior to actual development activity; and
- assess the specific impact of facility proposals.

To assist States and localities in meeting these needs, three OCS-related assessment methods have been published in 1978, sponsored wholly or in part by the Department of the Interior. These three are introduced on the previous page, and graphically portrayed in *Figure 1*. We define an OCS assessment method as a logically ordered sequence of steps for estimating what might happen because of OCS oil and gas development. Each of the three principal OCS assessment methods has a particular emphasis. The NERBC Method stresses planning—it is designed to anticipate and guide the critical facility siting decisions. CF, on the other hand, is more precisely an "impact" method, designed primarily to assess the environmental impacts of decisions already made. WESTON bridges planning and impact analyses.

This *User's Guide* is designed to help public officials and others concerned with estimating and planning for OCS oil and gas impacts. In a concise format, the *User's Guide:*

- tells how to select an OCS method which meets your information assessment and planning needs;
- compares and contrasts the methods according to several criteria important to State and local planners;
- describes the three principal planning and impact studies;
- introduces other relevant and potentially useful planning and impact studies; and
- identifies opportunities in the OCS process to influence decisions.

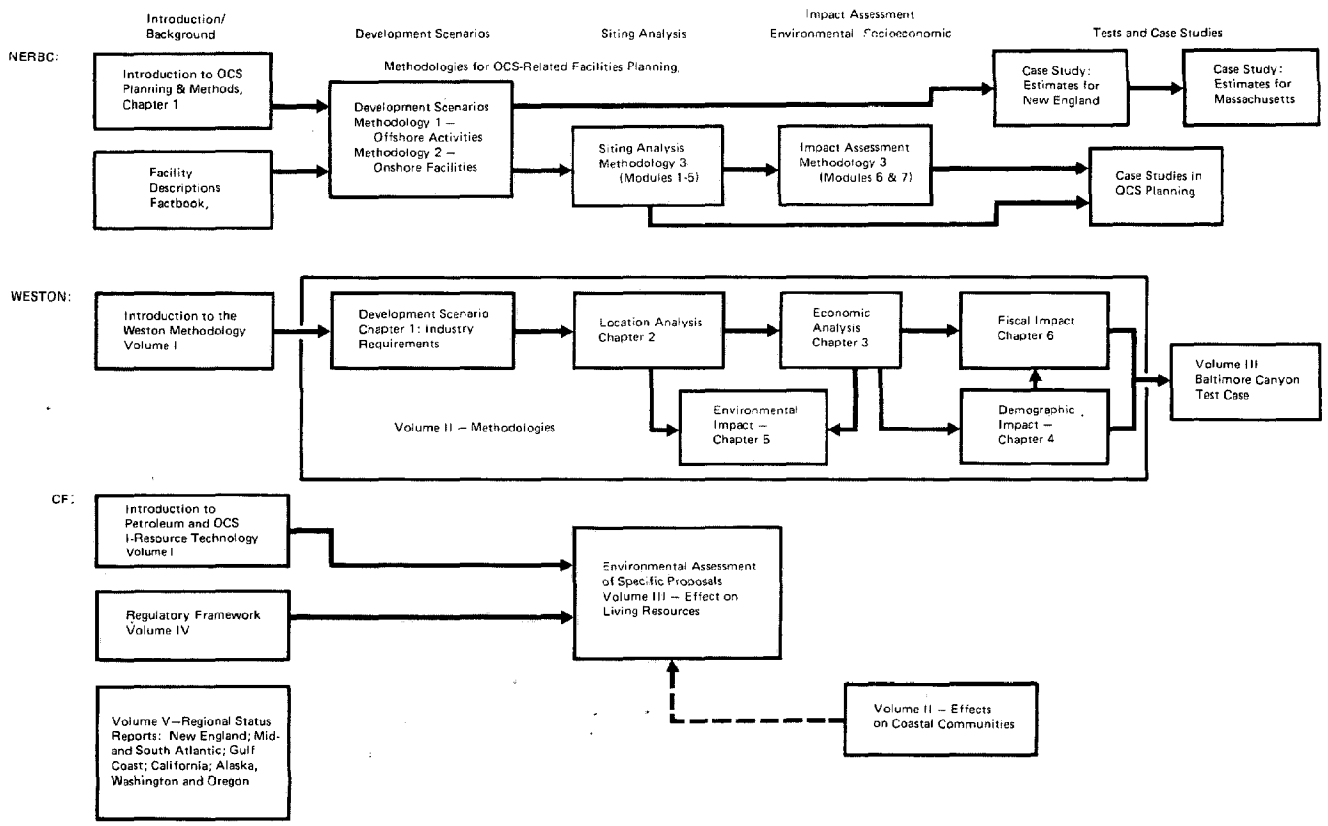
Using the User's Guide

The key chapter of this Guide is *Chapter 1—How to Select and Use an OCS Assessment Method.* It discusses the appropriate timing in the OCS process for study and planning, the criteria for approaching the methods, and the extent to which each covers important information needs. The questions to be considered in establishing criteria for selection of an OCS assessment method include: Where are you in the OCS process? What information do you need? How quickly do you need it and to what level of detail? How much staff time is available?

Criteria for selecting all or part of a method are:

- purpose and intended audience; geographic area (from entire leasing regions to specific communities)—(*See page 11 of this Guide*).
- level of detail required, which depends largely on the timing within the OCS process (*See Section 1.2 of this Guide*).
- the extent of assessment steps and character of information which an OCS assessment or planning method may provide, including:
  1. *Background information* on the OCS process, Federal role, and national and regional OCS experience (*Section 1.3*).
  2. *Generating development scenarios*—the level of offshore activity and the resulting type, number and size of onshore facilities (*Section 1.4*). A criticial decision is the transportation strategy for getting oil ashore.
  3. *Description of offshore activities and onshore facilities*—size, characteristics, and siting requirements (*Section 1.5*).
  4. *Analyzing site capabilities and facility needs (Section 1.6).*

Figure 1: Summary of the OCS Assessment Methods



5. *Forecasting*, in advance of development, *general* onshore environmental and socioeconomic *impacts (Section 1.7).*
6. *Assessing specific* onshore environmental and socioeconomic *impacts* of proposed *facilities (Section 1.8).*

Finally, *Chapter 1* suggests ways in which elements of the methods may be combined to meet needs that arise in planning and impact assessment. From *Chapter 1,* the user may go directly to one of the three chapters providing individual descriptions of the planning or impact methods:

Chapter 2: NERBC—Methodologies for OCS-Related Facilities Planning

Chapter 3: WESTON—Methodology for Assessing Onshore Impacts of Offshore Outer Continental Shelf Oil and Gas Development

Chapter 4: CF—Environmental Planning for Offshore Oil and Gas

These individual chapters present—for each study—the purpose and scope, a summary of contents, the expected results and examples of use, and the time and skill requirements. Separate sections, as listed in the *Table of Contents,* describe the content of each study's volumes.

Chapter 5 presents several other relevant studies which are more limited in scale and scope, but which may be useful in support of (or, to some extent, in place of) the three principal methodologies. *Part One* presents in some detail methods developed by two States which are applicable to other States:

- *Maryland Major Facilities Study*—covering a comprehensive siting analysis through *Regional Screening* (Volume I) and providing two excellent handbooks on impact assessment—*Economic, Fiscal and Social* (Volume III) and *Environmental* (Volume IV). The study covers other facilities than OCS-related; the test case was an *Eastern Shore Power Plan Siting Study* (Volume II).
- *Offshore Oil: Its Impact on Texas Communities*—creating development scenarios and assessing the impacts of each on multi-county regions and the entire State.

Part Two of *Chapter 5* presents the more specific methodologies of:

- Louisiana: *A Process for Coastal Resource Management and Impact Assessment*—demonstrating an excellent graphic presentation of findings;
- Alaska: *Management of OCS-Related Industrial Development*—concentrating on the responses available to a community;
- The *Harris Multi-Regional, Multi-Industry Forecasting Model* used by the Bureau of Land Management for OCS lease sale Environmental Statements.

Part Three of *Chapter 5* presents an *Annotated Bibliography* of studies and reports related to OCS planning and impact methods.

The *Guide* concludes with *Chapter 6: Decisions and Opportunities to Influence Offshore and Onshore Developments Related to OCS.* This chapter starts with an introduction to the OCS process and leasing schedule and then discusses in general terms the Federal authority and organization which has been established to deal with OCS development. Next, key decisions in the OCS process are described from a State viewpoint: Preparation for Leasing, Environmental Statement, Exploration Plan, Transportation Management Plan, and Development and Production Plan.

Chapter 6 goes on to describe how information and assistance is provided to States and local governments through the OCS Oil and Gas Information Program and the Coastal Zone Management Program, with its Federal consistency provisions and the Coastal Energy Impact Program (CEIP). The chapter ends with a brief section on *State and Local Opportunities to Affect Onshore Development.* Included are State and local planning and development controls, special OCS-related planning and regulation, and fiscal strategies.

Two helpful summary pages are inside the back cover:

- The "*Master Index*" locates pages within this *Guide* for: developing selection criteria, locating background information, generating development scenarios, descriptions of offshore activities and onshore facilities, siting analysis, forecasting general impacts, assessing specific impacts of facility proposals, information on the OCS development process, and opportunities for State and local action.
- "*Where to Order*" gives precise details on each of the volumes of the three principal methods, and how to obtain copies.

CHAPTER 1: How To Select and Use an OCS Assessment Method

The assessment method to be used—in whole, in part, or in combination—depends upon a number of critical factors, but especially on the right match of your needs and the method's characterisitcs. This *User's Guide* cannot make this match for you—rather it describes and compares the planning and assessment methods from a variety of viewpoints, and in enough detail, so that you can judge the appropriate one(s) to use in your particular situation.

In essence, this chapter recommends:

1) How to select a method,
2) How to locate information by topic, and
3) How to put it all together to meet your needs.

This latter concern, spelled out in *Section 1.9,* is vital for providing a comprehensive planning and assessment analysis.

1.1 *Criteria for Selection*

A number of factors must be kept in mind in making your selection. In "Toward a Methodology for OCS Planning," NERBC notes three:

> *First, the methodology must be flexible. No one knows where or how much oil and gas there is until wells are drilled, and the onshore effects are totally dependent on the outcome of the offshore activity. In addition, OCS development is a subject of extremely high visibility. Any planning process must be flexible enough to provide for variations in political objectives, supporting policy making without committing the policy maker to a course of action which might foreclose opportunities later on. The second given is that oil companies are virtually the prime movers offshore. As a result, any planning process must recognize their preferences and provide a mechanism for incorporating industry's basic requirements. . . Third, there may be no ideal site. . .*

The three principal studies all recognize these needs. First, all are flexible enough to adjust to new information and policy objectives—they can be run again at increasing levels of detail. Second, all recognize that the driving force is the oil companies and their offshore discoveries. Finally, all three incorporate industry's basic requirements for onshore facilities in their attention to siting questions.

To select a method, we suggest you establish criteria for evaluating the differences among the methods, such as—purpose and areal coverage, effort and cost, timing, and the basic types of information they contain. In fact, these are the very criteria which we use in this *Guide* to describe and compare the assessment methods. The first two of these are introduced here, with reference to the individual chapters.

Purpose and Areal Coverage—Who will use the method and for what purpose? What geographic area is being analyzed? Has the area had previous OCS development or is it a frontier area? The three principal assessment methods meet these criteria as follows:

	Purpose	***Geographic Area***	***OCS Experience***
NERBC	Planning, primarily for siting of onshore facilities	Leasing region, or State	Frontier
WESTON	Comprehensive impact assessment of development scenario	Leasing region, or State	Frontier and previous development
CF	Environmental impact assessment of specific proposed facility	Community of proposed facility	Frontier and previous development

Effort and Cost—What are the requirements for available information and for staff skills? What is the estimated time and cost of using the methods? Effort and cost will vary according to the use of the results, the level of detail required, the information available, and other factors which make estimates (and comparisons) uncertain. Effort and cost requirements are described for individual methods in *Chapters 2, 3, 4 and 5.*

Timing—What are the decision points in the OCS development process for which results are needed? *(See Section 1.2)*

Basic types of information which are covered by the OCS methods:

Background information	*(See Section 1.3)*
Generating development scenarios	*(See Section 1.4)*
Describing offshore activities and onshore facilities	*(See Section 1.5)*
Analyzing site capabilities and facility needs	*(See Section 1.6)*

Figure 2: Decisions in the OCS Process—and When to Use the Assessment Methods

No.	Federal Decisions*	Opportunities and Actions	Use of Assessment Methods
1	Tentative Sale Schedule (established in five-year leasing program)	Recommendations to Secretary of the Interior	At preliminary level: —generate development scenario —forecast general impacts
2.	Call for Nominations	Response to Call For Nominations	—
3.	Tentative Tract Selection	—	—
4a.	Preparation of Draft Environmental Statement	Review and Comment on Draft ES	Generate development scenario, as check on Draft ES
4b.	Publication of Final Environmental Statement	—	Use Final ES for: Siting analysis Forecast of general impacts
5.	Draft Secretary Information Document (SID) and Proposed Notice of Sale	Review and Comment on Proposed Notice of Sale	—
6.	Final SID	—	—
7.	Final Tract Selection	—	—
8.	Notice of Sale	—	—
9.	SALE—Lease Issued	Planning for Exploration Impact	Use sale data for: —generating development scenario —updating siting analysis —forecasting general impacts
10.	Exploration Plans (with Environmental Reports) Evaluation and Drilling Permit Approval	Response to Exploration Plans, including comments on Environmental Reports	Use information developed above
		State/Local Permits for Exploration Stage Onshore Facilities	Assess specific impacts of proposed facilities
11.	Transportation Management Plan	Input by Affected States into joint Federal/State Regional Working Groups	Generate development strategy based on transportation management plan.
	[Discovery may occur at this point—if no economically recoverable find is made, the following decisions and steps will not take place]		
12.	Development and Production Plans (with Environmental Reports) Evaluation and Approval for Drilling	Response to Development and Production Plans, including comments on Environmental Reports	Use find/discovery information to —generate detailed scenario —analyze siting in detail —forecast general impacts
		State/Local Permits for Development and Production Onshore Facilities	Assess specific impacts of proposed facilities
13.	Pipeline Permit Issuance	State/Local Permits for Onshore Pipelines	Assess specific impacts
14.	Lease Termination or Expiration		

* *See Section 6.3* for discussion of Federal OCS Decisions.

Forecasting general impacts of scenarios *(See Section 1.7)*
Assessing specific impacts of proposed facilities *(See Section 1.8)*

1.2 *Timing—And The OCS Decision Process*

The best time to use an element of an assessment method depends on the phasing of development—where the region or community stands in the OCS process. *Figure 2* shows 14 decisions in the Federal OCS process and a number of key potential State and local responses and actions. The key Federal decisions are: Preparation for Leasing, the Environmental Statement on the lease sale, review and comment on the Exploration Plan (and its Environmental Report), the Transportation Management Plan, and review and comment on the Development and Production Plan (and its Environmental Report). For more discussion of these key decisions, see *Section 6.3).*

State and local governments have numerous opportunities to participate in these Federal decisions, as shown in the second column of *Figure 2.* The best timing for use of the assessment and planning methods which are described in this *User's Guide,* is suggested in the third column. At the time of early Federal decisions, most effective use of a method may be at a preliminary level, with each use becoming more and more detailed up through the development and production stage.

1.3 *Background Information*

NERBC and CF provide information that is useful or necessary for impact analyses and planning. NERBC's premier reference work, the *Factbook,* provides detailed descriptions of potential onshore facilities—and is itself described in *Section 1.5—Offshore Activities and Onshore Facilities* and *Section 2.5—Factbook.* Other than the *Factbook,* NERBC's background information is provided as an introduction to *Methodologies for OCS-Related Facilities Planning. Chapter 1—The OCS Planning Environment* considers the uncertainties of OCS development, the relationship between planning and policy formulation, and new tools for controlling OCS development.

CF's *Environmental Planning for Offshore Oil and Gas* provides a comprehensive introduction to OCS development. Three of its five volumes are essentially reference works:

Volume I —*Recovery Technology* introduces the oil and gas industry, the outer continental shelf, and the phases of OCS oil and gas development (*See Section 4.1*).

Volume IV—*Regulatory Framework for Protecting Living Resources* describes the Federal regulatory programs affecting OCS development, especially those of the Fish and Wildlife Service (*See Section 4.4*).

Volume V —*Regional Status Reports* presents five separate documents on OCS experience, potential impacts of OCS activities on living resources and habitats and information sources for New England, Mid-and South Atlantic, Gulf Coast, California, and Alaska, Washington and Oregon (*See Section 4.5*).

1.4 *Generating Development Scenarios*

Generating a development scenario is the initial step in an assessment method. It is a means for estimating—for placing reasonable boundaries on—the range of *offshore activities* which might occur and the *onshore facilities* which might logically result. The scenario approach uses both historical trends and present assumptions, which are linked into calculations which result in estimates of the scale and timing of OCS activities and facilities.

Scenarios are not predictions of what will happen, but rather what might happen under a set of assumptions. The results provide insights which may guide planners and policy makers. A further note of caution: The scenario is only an estimate of what might happen if assumptions about oil and gas discoveries are borne out.

Both the NERBC and WESTON assessment methods provide for comprehensive development scenarios, as compared in *Figure 3:*

NERBC	Methodology 1: Offshore Activities *(See Section 2.2)* Methodology 2: Onshore Facilities (*See Section 2.3)*
WESTON	Volume II, Chapter 1: Industry Requirements (*See Section 3.3*)

CF provides limited discussions of "development strategy" for each facility in Volume I: Part 2—OCS Development Systems.

Both NERBC and WESTON consider the critical offshore factors to be the total recoverable reserves of oil and gas (with the estimates coming from the U.S. Geological Survey), the number and size of discoveries, industry operating practices, and the chosen transportation scheme. The NERBC method carefully spells out each of the assumptions and calculations used in developing the scenario. In NERBC's Methodology 1 (Offshore), for example, there are 8 work elements, comprised of 39 tasks and 71 steps. Typically, NERBC provides an introductory discussion for each work element, and then calls for a series of work tasks. The initial tasks involve use of the *Factbook,* historical data, or consultation with Federal or industry sources to define a condition or determine a number. The final task is generally a calculation to come up with the work element product. Products of the development scenario for both NERBC and WESTON are compared in *Figure 3.*

Figure 3: Comparison of Products for the Development Scenario—NERBC and WESTON

NERBC	*WESTON*—Industry Requirements, Chapter 1
Methodology 1: Offshore Activities	
Schedule of oil and gas finds	—not covered—
Leasing schedule	—not covered—
Schedule of exploratory rig activity	Schedule of mobile drilling activity
Platform requirements	Development/Production Scenarios
Platform installation schedule	Platform installation and wells drilled
Development drilling schedule	
Production schedule	Platforms in operation and flow rates
—not covered—	Platform/well workover schedule
Materials, jobs, wages, boats and helicopters are calculated by using the *Factbook* for each facility, as demonstrated in *Estimates for New England*	Materials, e.g., cement, mud, fuel Operating offshore jobs and salaries Operating onshore jobs and salaries Construction jobs and salaries Transportation vehicles
Methodology 2: Onshore Facilities	
The need for, and the estimated number (but not characteristics) of:	All or most of: employment, salaries, land area, power and water needs, and capital costs (but not numbers) of:
Temporary service bases	Service bases
Permanent service bases	Helicopter bases
Ancillary industries	—not covered—
Platform fabrication yards	Fabrication yards
Satellite fabrication yards	—not covered—
Pipe coating yards	Pipe coating yards
Onshore partial processing plants	—not covered—
Refineries	—not covered—
Oil company district offices	—not covered—

At first appearance, the WESTON calculations seem more difficult. There are a large number of charts, tables and worksheets to be filled in. WESTON, however, provides detailed numbers or assumptions to be used to make the calculations, based on industry practices as determined by WESTON. Beyond the initial resource estimate, therefore, no consultation with Federal or industry sources is needed. Further, WESTON has developed techniques for significant reduction of the time required for data calculation, by use of programmable hand-held calculators. These techniques are described in the WESTON Test Case—Volume III (*See Section 3.9)*

NERBC calls for considerably more judgment on the part of the user than does WESTON. Further, there is more research required, and calculating time—if the scenario is done manually—may be longer than WESTON. NERBC, however, does provide the user with a much deeper understanding of the assumptions which go into the scenario. Results of NERBC are provided in a simpler format, which may easily lead into NERBC's siting analysis. Actual use of NERBC for a development scenario is described in *Sections 2.6 and 2.7.* The WESTON Test Case, which generated a 42-year scenario for the Baltimore Canyon, is discussed in *Section 3.9.*

The TEXAS methodology develops three scenarios, tied to two specific lease sales. Assumptions are made, based on Texas experience, of locations of finds, types of activities, industry practices, numbers of tracts and platforms, and production rate. From these, the methodology calculates employees, supplies, acres of land, docking space, and water requirements for each of the seven multicounty regions along the Texas Coast (*See Section 5.2*).

Developing a Transportation Strategy

One of the most important questions in OCS development is whether to pipe or ship produced oil to shore (commercial quantities of gas are almost always piped ashore). All three principal reports discuss the factors which go into making a transportation decision:

NERBC	Factors influencing the design are size of the find, distance from shore, meteorological conditions, oceanographic conditions, ultimate destination, and the availability of terminals—these are discussed in great detail in the *Factbook* (pages 3.4 through 3.9).
WESTON	Factors are primarily geographic area (frontier or not) and distance from shore (Volume II, Section 1.7).

CF — Minor discussion of "development strategy" for pipelines (Volume I, Section 2.2.4).

Making the transportation decision is part of the development scenarios for NERBC and WESTON:

NERBC — Methodology 2, Work Element 1 assesses the need for oil pipelines and gas pipelines, which determines the need for other facilities such as pumping and compressor stations. (*See Section 2.3*).

WESTON — Industry Requirements poses three alternative schemes for the transportation of crude oil, and three for gas. The planner uses WESTON tables to select the appropriate transportation scheme for the geographic area involved. (*See Section 3.3*).

The WESTON method on transportation strategy is the simplest to use, taking only a few minutes. The NERBC method requires more effort, with separate steps for determining the need for and the number of oil and gas pipelines, but the results are more useful in estimating the number and location of pipelines and associated facilities. Further, it is very difficult to separate the estimation of need and number of transportation facilities from the entire group of onshore facilities in the NERBC method. The WESTON technique, on the other hand, provides separate estimates and may be used to check the NERBC findings. Facilities covered in NERBC and WESTON are listed in *Figure 4.*

It should be noted that the transportation strategy is a primary focus of the Transportation Management Plan, prepared for each leasing region under the guidance of BLM and USGS (as Decision #11 in the OCS process—*See Section 6.3*). Familiarity with the results of the transportation question therefore may be important in achieving State and local participation in preparing and commenting upon that plan.

1.5 *Offshore Activities and Onshore Facilities*

Following creation of the development scenarios which identify likely facilities, State and local planners will want to focus their attention more selectively on those types of offshore activities and onshore facilities most likely to affect their jurisdictions. The principal assessment methods identify a broad range of approximately 15 to 18 activities and facilities, as shown in *Figure 5.*

The word "approximately" is most appropriate, for the methods do not agree on the total number, the names or titles, or the component elements of activities and facilities. Nor do they agree on whether certain facilities (especially processing) are really OCS-related. What this means to the user is:

Figure 4: Facilities Covered in the Transportation Strategy

NERBC	*WESTON*
—	Submarine Pipelines
Crude oil pipelines and pumping stations	Oil transmission pipelines Booster pump stations (offshore and on)
Natural gas pipelines and pumping stations	Gas transmission pipelines Compressor stations (offshore and on)
Pipeline installation service bases	—
Gas processing and treatment plants	Gas processing plants
Main terminals	Tanker terminals Tanker moorings Tank farms
—	Refineries
—	Onshore LNG plant
—	LNG tanker terminal
[NERBC also develops a pipeline installation schedule]	—

Figure 5: Offshore Activities and Onshore Facilities Covered by the Principal Assessment Methods

		WESTON		
Offshore Activities	*NERBC*	*Industrial Requirements*	*Location Analysis*	*CF*
1) Geophysical surveying				XX
2) Exploratory drilling	X	XX		XX
3) Development [production] drilling	X	XX		XX
3a) Well workover		X		
Onshore Facilities				
4) Service bases		XX	XX	XX
4a) Temporary service bases	XX	X		
4b) Permanent service bases	XX	X		
4c) Pipeline/platform installation service bases	XX			
	XX			
4d) Helicopter bases	X	XX	XX	X
5) Marine repair and maintenance yards	XX		XX	XX
6) Ancillary services	XX (two phases)		XX	XX
7) District offices	X			
8) Platform fabrication yards	XX	XX	XX	XX
8a) Satellite fabrication yards	XX			
9) Pipelines	XX	XX	XX	
9a) Offshore	X (separate	X	X	XX
9b) Onshore	X (for oil (and gas	X	X	XX
9c) Pump stations (oil)	X	XX	XX	
9d) Compressor stations (gas)	X	XX	XX	
10) Pipe coating yards	XX	XX	XX	XX
11) Partial processing plants	XX	XX	XX	
12) Gas processing plants	XX	XX	XX	XX
13) Tank farm/storage terminals	X	XX	XX	XX
14) Marine terminals	XX	XX	XX	
14a) Deepwater ports	X	X		XX
Processing [not necessarily related to OCS activities]				
15) Oil refineries	XX			XX
16) Petrochemical plants	(*Factbook* only)			XX
17) Liquid natural gas (LNG) plants		XX		XX

XX—major category

X—part of another category

1) For some facilities, the choice of method will be restricted because they are covered in only two methods (or only partially in one); e.g., Oil refineries are covered only in NERBC and CF. Petrochemical plants are covered in CF and NERBC's *Factbook* only (with no coverage for scenario or siting analysis.) LNG plans are covered only in CF and WESTON's Industrial Requirements (with no coverage of siting analysis).

2) Facilities are treated differently—in focus and level of detail—in different methods depending largely on how a "facility" is defined and what elements are included. The user will have to carefully check the definition and coverage under each method. For example, a comparison of the three methods shows significant differences in:

Service bases: CF and WESTON's Location Analysis treat service bases as one generic type, while WESTON's Industrial Requirements divides them into temporary and permanent. NERBC provides the most detail by breaking service bases into four distinct categories. Helicopter bases are treated separately in WESTON, but included under service base categories for the other methods.

Pipelines: NERBC divides pipelines into "crude oil pipelines and pumping stations" and "natural gas pipelines and compressor stations." WESTON has categories for "pipelaying (both offshore and onshore)," "submarine pipelines," "pump stations (both offshore and onshore)," and "compressor stations (offshore and onshore)." CF covers "pipelines" in Volume I, but in Volume III (the environmental methodology) divides them into "offshore" and "onshore oil and gas transmission systems."

Terminals: NERBC has one category called "marine terminals," which includes tank

farms and single point mooring systems. WESTON has categories for "tank farms," "tanker terminals," "tanker moorings," and "offshore moorings." CF covers "offshore mooring and tanker operations" and "oil storage terminals."

The *Maryland Major Facilities Study (See Section 5.1)* considers service (operations) bases, platform fabrication yards, pipeline landfalls, pipe-fed and tanker-fed intermediate production terminals, natural gas processing plants, oil storage facilities, oil refineries, and LNG receiving terminals and storage facilities. The Texas *Onshore Impacts* study *(Section 5.2)* covers service bases (including marine repair and maintenance yards, ancillary services and district offices), refining, gas processing, exploratory drilling rig construction, platform fabrication, petrochemical plants, and storage facilities.

Information Provided on Activities and Facilities

Figure 6 shows information available from the principal methods on description, site requirements, environmental effects, and employment. Siting strategies for facilities are covered under the following *Section 1.6*, while facility impacts are compared in *Section 1.8*.

The facility information from the NERBC *Factbook* has been very nicely and handily summarized on 17 individual pages in Chapter II of the *Source Book*. *Figure 11* reproduces one of those pages as an example. The *Source Book* pages include the three offshore activities not included in NERBC's *Factbook*.

1.6 *Siting Analysis*

Siting analysis is a procedure for identifying potential areas and sites which meet public policy criteria and industry requirements for specific OCS-related facilities. The NERBC and MARYLAND approaches are quite similar in applying a screening process to potential sites, coming up with candidates sites, and ranking (or defining impacts) for alternatives. WESTON, on the other hand, starts with the facilities, defining need and industry criteria, and finally applying them to individual sites.

NERBC starts with the identification of sites potentially capable of meeting industry standards. The types of potential sites to be considered are limited by the findings of the development scenario. Industry requirements have been spelled out in the *Factbook*—"Timing, Trends, and Options"—for each facility (these are summarized in Chapter II of the *Source Book)*. Suitability—or public policy—criteria are applied to potentially capable sites to come up with "candidates sites" which meet both sets of criteria. In addition, the NERBC provides for preliminary institutional analysis and defining facility siting objectives (which are not a part of the WESTON method) prior to specific proposals. Ranking of alternative sites would come only after a detailed impact assessment of specific proposals. *(See Section 2.4.)*

MARYLAND MAJOR FACILITIES STUDY is a comprehensive regional screening process which applies a set of siting criteria to all the lands and waters within the coastal zone. The extensive collection of data assumes much information is already available in the state government, and uses a computer-based geographical information

Figure 6: Information Provided on Activities and Facilities

Information	NERBC	WESTON	CF
Description	Concise: *Source Book*, Ch. II—Text, photo; 1-2 pages Extensive: *Factbook*—Text, photos, plans	Names only of activities and facilities	Concise profiles: Vol. III, Part 3. group 1—Narrative; summary of Vol. I Detailed: Vol. I, Part 2—Narrative and graphic
Site Requirements	Concise: *Source Book*, Ch. II—land, waterfront, water depth, sea access, water Extensive: *Factbook*—Land, waterfront, water, energy, transportation	Concise: Vol. II, Ch. 1, Sec. 10—Land, water and power; in graph related to production rate Concise: Materials Needs, Vol. II, Ch. 1, Sec. 2—Tubular steel, pipe, cement, mud, fuel, water, food	Concise: Vol. III, Part 3. group 2—Narrative, summary of Vol. I Detailed: Vol. I, Part 2—Narrative on location, e.g. access roads
Environmental Effects	Concise: *Source Book*, Ch. II—Line each on site alteration, air emissions, wastewater, noise, solid waste Detailed: *Factbook*—all of above plus sedimentation, safety hazards, aesthetics *Factbook:* Detailed appendices on site alteration; air emissions, water discharges, noise, solid waste; vehicle emissions	Concise: Environmental Factors, Vol. II, Ch. 1, Sec. 12—Wastes and emissions—liquid wastes, sanitary and solid wastes, tanker wastes and ballast water—all on graphs for each facility, by production rate	Concise: Vol. I, Part 2—construction and installation, .4—operation, and .6—effects on living resources Detailed: Vol. III, Part 3—potential sources of disturbance for 20 subprojects
Employment	Concise: *Source Book*, and detailed: *Factbook*—labor requirements and wages	Concise: Jobs and Salaries, Vol. II, Ch. 1, Sec. 3-8—Operating offshore, onshore construction—by professional, administrative, skilled, and unskilled	Concise: Vol. I, Part 2—Community effects Detailed: Vol. II, Appendix A

system. The criteria applied are: (1) facility-related, including threshold (e.g., water depth) and optimal (e.g., labor availability); (2) exclusion, e.g., Federally owned, and (3) potential restriction, e.g., natural resource protection. The steps in the screening process are: identification of threshold areas, identification and description of candidate areas, and determination of most suitable candidate areas. The MARYLAND procedure ranks sites before specific proposals are received. The results of this analysis may be graphically presented for each type of facility and criteria, for the entire coastal zone with data shown in grid cells of 90 areas each *(See Figure 22).*

The MARYLAND process places a heavy emphasis on conflict resolution: facility needs vs. site capabilities, competing facilities, facility needs vs. public policy, and competing public policies. The regional screening process reduces the number of conflicts by assuring at least one suitable site for each potential type of OCS-related facility *(See Section 5.1).*

WESTON starts with the full range of potential OCS facilities. Within the "location analysis" *(Chapter 2 of Volume II)* there is a flow diagram for each facility which illustrates decision points and checkpoints. The first decision point is to determine the need for the facility (which is part of the development scenario in NERBC). The siting method then follows, done for each facility individually; a heuristic process of identifying and ranking alternatives. In addition, the product includes a listing of environmental constraints for each site *(See Section 3.4).*

CF's introductory volume presents narrative "development strategies" and "regulatory factors" for each facility, but provides no siting technique.

1.7 Forecasting General Impacts

One of the major reasons for going through the scenario development and siting analysis is to estimate what the impacts onshore will be from OCS activities offshore. In our analysis of the methods, "general impacts" are those which are forecast prior to development based on a development scenario of some type. Impacts are usually forecast for the entire leasing region, a State or other large area, for the whole array of potential activities and facilities. On the other hand, the "assessment of specific impacts" discussed in *Section 1.8* following is based on specific facility proposals for specific sites. These specific impacts are assessed for the site itself and the immediate community.

Figure 7: Forecasting General Impacts

Assessment Method	Environmental	Economic/Employment	Social/Demographic	Fiscal/Public Service
NERBC	Methodologies—Methodology 3: Site identification and impact analysis calls for preliminary impact assessment in Work Element 10 (module 4) as part of siting analysis. Assessment to cover broad range of impacts, but NERBC does not provide methodology or assessment techniques.			
CF	Estimates for New England accumulates discharges, e.g., air emission, noise for entire region.	Estimates, accumulates employment and wages for entire region	Not covered	Not covered
	—General impacts not covered—	Volume II, Chapter 2—Forecasting Employment and Population Starts with individual facilities; shows simple method of projection of new resident employment, total population added, housing needs and school enrollment.		Volume II, Chapter 6—Fiscal impact Identifies public services for wide list of community facilities; no costs or revenues
TEXAS	Volume II: Methodology F uses impact matrix to identify land, water and waste residuals.	Methodologies B, C & D project employment and income.	Methodology G uses social impact matrix to identify demographic and public service effects.	Methodology E identifies tax revenues and infrastructure costs for State and local government.
WESTON	Volume II, Chapter 5—Environmental Impact	Volume II, Chapter 3—Economic Analysis	Volume II, Chapter 4—Demographic Impact	Volume II, Chapter 6—Fiscal Impact
	Basic framework; estimate base condition, compare with OCS condition	Input-output models to compare base and OCS conditions; three alternatives	Uses OBERS model to OCS-related population; number of new residents	Estimate base and OCS-related expenditures and revenues; three alternative methods.
	For area impacted by specific project	For SMSA or BEA economic area	Primarily for county level, can be local	For State and county, not local, levels

General impacts forecast prior to development are especially important as a source of comments to the Federal government on the potential effects of proposed leasing programs and OCS lease sales. Both NERBC and WESTON use the forecast general impacts as a feedback to the development scenario and siting analysis (with WESTON's built into the overall method).

The three methods address both environmental and socioeconomic impacts, although the techniques vary and the scope and level of analysis are substantially different. In contrast to many earlier studies of impacts, these methods attach greater significance to the socioeconomic impacts: economic, fiscal, and social. *Figure 7* compares the three assessment methods on their coverage of forecasting of general environmental and socioeconomic impacts.

General Environmental Impacts

Forecasting environmental impacts is difficult prior to specific facility proposals, for the character and condition of the site of facilities is as important in determining impacts as the effects of the facility itself. These forecasts are more general than those for socioeconomic impacts, where employment and income, for example, are projected regionally.

NERBC: As part of the siting analysis NERBC calls for "a preliminary impact assessment of facility location on capable areas or sites." A matrix system is suggested for the development of impact indices. The method is clear, but rather simplistic compared to other assessment methods *(See Section 2.4,* Module 4).

TEXAS: The Texas method uses an environmental impact matrix to identify likely effects for a sub-State region *(See Section 5.2,* Methodology F).

WESTON: The WESTON method presents an overall framework for preparation of an environmental assessment, essentially projecting future conditions without OCS activity, and contrasting this to conditions with it. Three assessment techniques are presented: question analysis—for smaller projects with moderate impacts, matrix analysis—for medium size projects, and optimum pathway matrix—for larger projects with significant impacts. This is the only method which spells out possible sources of information for each technique. In addition, WESTON points out some ameliorative actions *(See Section 3.7).* WESTON's Environmental chapter may also be used for assessing specific impacts, discussed in the following *section.*

NOTE: CF is not discussed in this *section* because it is facility specific.

General Socioeconomic Impacts

As under environmental impacts, NERBC calls for impact assessment, but assumes other methods and techniques will be used to accomplish this. A range of techniques, from simple, general approach to quite detailed techniques requiring significant effort, are available in the other methods:

CF: Volume II—*Effects on Coastal Communities* is one of the best introductions to the effects of increased population, one which would be useful to planners and policymakers unfamiliar with OCS impacts *(See Section 4.2).*

TEXAS: In Volume II—*Local Impact Scenarios,* Methodologies B, C, and D provide employment, income, and tax revenues for the exploration, development and production phases, respectively. Methodology E aggregates these for seven study areas and identifies public service costs and revenues. Methodology G provides a social impact assessment *(See Section 5.2).*

WESTON: Provides the only comprehensive view among the principal methodologies, with chapters covering economic (3), fiscal (6), and demographic (social)(4) impacts. Further, it is the only methodology providing alternative ways of forecasting economic and fiscal impacts (it has one method for demographic). The alternatives are:

	Level of analytical effort:		
Type of impact	*Low*	*Medium*	*High*
Economic *(Section 3.5)*	Weston technique	RIMS	HARRIS Model*
Fiscal *(Section 3.8)*	Blend of programmed Methodology and State forecasts	Programmed Methodology	HARRIS Model*

**See Section 5.5.*

In each impact forecast, the WESTON method is to develop a base case and compare it to estimated impact values.

1.8 *Assessing Specific Impacts of Proposed Facilities*

Upon the receipt of proposals for site specific onshore OCS-related facilities, States and local governments need to know specific environmental and socioeconomic impacts before issuing permits. The methods provide several excellent techniques for assessing environmental impacts and one has an exceptionally comprehensive handbook for socioeconomic impacts.

Specific Environmental Impacts

The assessor of environmental impacts has five possible methods presented in these documents. First, three WESTON environmental techniques—discussed above for general forecasts—may be used for specific assessment:

- Question matrix—the simplest technique, posing a series of questions about smaller projects of moderate impact;
- Matrix analysis—using a matrix to analyze residuals and alterations, and a Delphi Panel to quantify impacts; and
- Optimum pathway matrix—a comprehensive, computer-based treatment of large-scale projects with significant impacts.

(See Section 3.6 and *Figure 17* for details.) The WESTON techniques rely heavily on the NERBC *Factbook* and CF's Volume III—*Effects on Living Resources and Habitats.*

The most original and comprehensive methods are provided in the CF and MARYLAND reports:

- CF: *Effects on Living Resources and Habitats*—Volume III is one of the strongest and clearest environmental assessment procedures available. It brings clarity to the definition and concept of impact assessment. The essence of this approach is that disturbances caused by OCS projects are just different combinations of disturbances the reviewer is already familiar with. Its process creates ten groups of projects, breaks them down into subprojects, and then identifies and describes the sources of disturbance which are most likely for each. This format is easily understandable and simple to use. The subprojects and sources are comprehensive *(See Section 4.3).*
- MARYLAND: An excellent guide for local planners to use in assessing the impacts of specific facilities. Volume 4 is the *Environmental Assessment Handbook* which identifies 45 activities and their specific environmental factors (26); an assessment process is presented for each. The final part of the handbook provides a method for evaluation: a means of comparing the results of all the environmental factor assessments and arraying them. Unlike NERBC's general forecasting, the MARYLAND method does not multiply and add values to determine "impact," concluding that assessment is judgmental *(See Section 5.1).*

Specific Socioeconomic Impacts

The only comprehensive system for assessing specific impacts of proposed facilities is provided in the *Maryland Major Facilities Study.*

- MARYLAND: Volume 3 is the *Economic, Fiscal and Social Assessment Handbook.* Within each of the chapters on employment and income, population and housing, public revenues, service demands, and public costs, there is a discussion of concept, materials needed to run the model, and directions on how to operate the assessment models. Social effects are considered to be nonquantitative. The entire assessment may be done manually. It is flexible enough to be used for non-OCS facility development, such as residential subdivisions and general growth patterns *(See Section 5.1).*

1.9 *Potential Combinations of Methods*

Once you have evaluated the available methods against your selection criteria *(See Sections 1.1-1.8),* it may be useful to look at the potential advantages of combining some of the methods. Alone, none of the three principal or two State methods cover all of the elements necessary for a complete forecasting of potential OCS development and onshore impacts. A complete package—including generating a development scenario, siting analysis, forecast of general impacts, and assessment of specific impacts of proposed facilities—can only be created by combining all or parts of two or more methods.

In *Figure 8,* we present several reasonable combinations covering the range in level of effort and completeness of results. These combinations may guide you in assembling your own package. In selecting the parts for each combination, we kept a number of key points in mind [refer to *Figure 8* as you read these]:

- Each of the assessment methods has *strengths* which should be taken advantage of—
  - NERBC provides a general and easily understandable introduction taking an analyst through the siting of onshore facilities.
  - WESTON provides an integrated methodology for the entire process up to the receipt of specific proposals.
  - CF has the strongest and clearest method for assessing the environmental impacts of facility proposals.
  - MARYLAND has the most detailed siting analysis, and most complete assessment of specific socioeconomic impacts.
- Each of the studies has *gaps* in elements covered, which we identify as:
  - NERBC—detailed siting analysis, specific impact assessment.
  - WESTON—specific impact assessment.
  - CF—development scenario, siting analysis, specific assessment of socioeconomic impacts.
  - MARYLAND—development scenario, forecasting of general impacts.
- The TEXAS methodology is an integrated package, and therefore would not easily be combined with other methods; it is not considered here. However, in effort required and degree of detail it would fall between categories *1* and *2* in *Figure 8.*
- The level of effort and degree of completeness of results should be similar, or at least compatible. A combination would not use the simplest method in one element and the most complex in another.

Even so, at virtually every step of the planning/impact process, the user has the choice of at least two methods to use.

- The two systems of generating a development scenario are both thorough and acceptable for planning purposes, with WESTON providing a more detailed and complete result than NERBC. Either one could be used in any of these combinations, although generally we would suggest using the NERBC scenario with the NERBC siting analysis, and the WESTON scenario with the complete WESTON method.

- The siting analyses present varying levels of detail:
  - NERBC: Methodology 3 (Modules 1-5)—general, requiring substantial analyst judgment, suggested for use with the NERBC scenario.
  - WESTON: Volume II, Chapter 2—*Location Analysis*—more detailed, suggested for use with the WESTON scenario.
  - MARYLAND: Volume I—*Regional Screening*—most complete, with enough information for general impact forecasts, but requires extensive available data. Could be used with either NERBC or WESTON scenario.

  General impact forecasts vary in purpose and detail, and the user should evaluate the sections on each of these. WESTON is the only one to cover all the socieconomic impacts, and it provides three options (from low to high in effort and results) for environmental, economic and fiscal impacts (though not for social). WESTON is therefore suggested for Combinations 2-5. Combination 1 is a relatively simple blending of NERBC and CF.

- Environmental assessment of specific facility proposals, under any of the combinations, may be done by either of two methods:
  - CF: Volume III—*Effects on Living Resources and Habitats*—a clear and powerful technique which can be used with any method; we suggest using it with the NERBC siting analysis.
  - MARYLAND: Volume 4—*Environmental Assessment Handbook*—complete method for each type of facility; suggested for use with the MARYLAND and WESTON siting analysis.

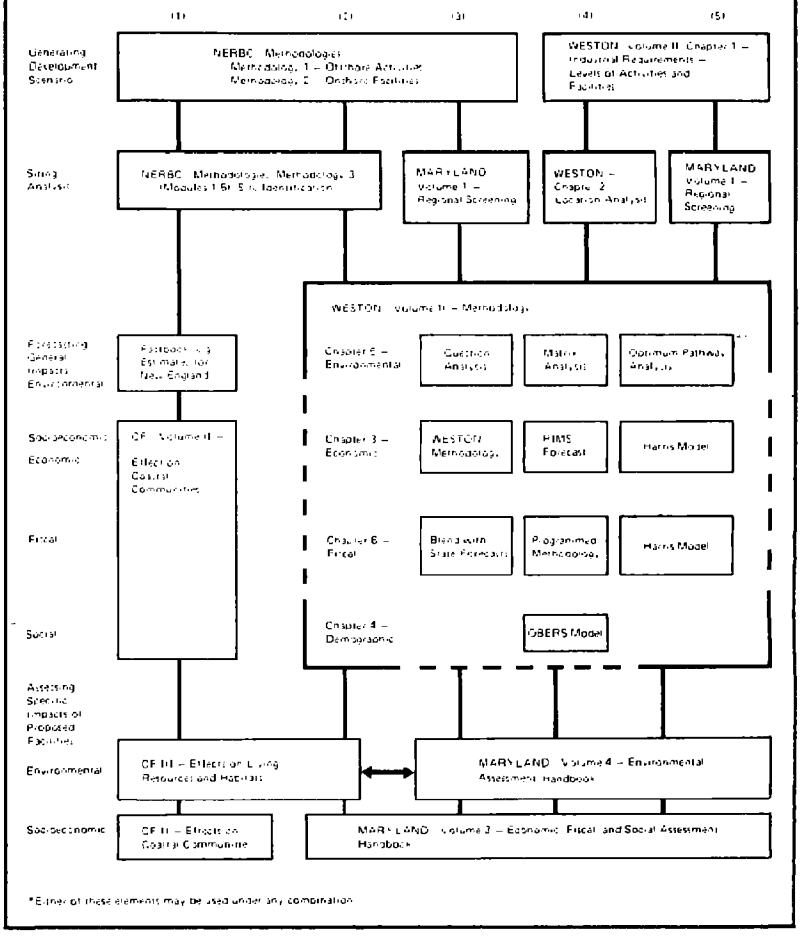
- Socioeconomic assessment of specific proposals is addressed thoroughly only in MARYLAND Volume 3—*Economic, fiscal, and Social Assessment Handbook*, and is therefore suggested for four combinations.

- Introductory material would be useful with any methodology or combination, including these documents:
  - NERBC: *Factbook* (first report)—most complete facility descriptions.
  - CF: Volume I—*Recovery Technology*—background and descriptions.
  - Volume II—*Effects on Coastal Communities*—fine introduction.
  - Volume IV—*Regulatory Framework*—only volume on this subject.

In summary, the level of effort required and the detail of result generally moves from the easy-to-do and general in Combination 1 to the highest effort and result in Combination 5. Combination 1 has everything NERBC and CF have to offer, demonstrating how well these two complement each other. Combination 4 uses the entire WESTON method, supplemented by MARYLAND for the specific assessment; #5 uses the MARYLAND siting analysis and thus is a complete use of MARYLAND, supplemented by WESTON. Combinations 2 and 3 each use at least three methods, and therefore are not as well integrated as the three other combination packages.

Figure 8:

Five Potential Combinations of Assessment and Planning Methods



CHAPTER 2: NERBC—Onshore Facilities Related to Offshore Oil and Gas Development

The New England River Basins Commission (NERBC) OCS Project developed and tested a method to help State and local officials plan for the siting of onshore facilities. NERBC is a regional organization including the States of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island and Vermont. While the test naturally focused on New England, the method's potential use is national in scope. Funding for the study was provided by the Resources and Land Investigations (RALI) Program, U.S. Geological Survey, Department of the Interior.

Four reports have been issued by the NERBC/RALI Project:

- *Methodologies for OCS-Related Facilities Planning (See Section 2.1).*

Methodology I—Estimating Offshore Activities Associated with OCS Oil and Gas Development (Chapter 3—*See Section 2.2).*

Methodology II—Estimating Onshore Facilities Associated with OCS Oil and Gas Development (Chapter 4—*See Section 2.3);* facilities likely to be required to support a given level of offshore activity.

Methodology III-Site Identification and Impact Analysis (Chapter 5—*See Section 2.4*); which calls for identifying suitable sites before specific proposals are made and making detailed assessments afterwards.

- *Factbook*—encyclopedic reference work on twelve onshore facilities *(Section 2.5)*
- *Estimates for New England*—using the NERBC development scenario *(Section 2.6)*
- *Case Studies in OCS Planning*—showing how the NERBC methods were applied in four New England States *(Section 2.8).*

2.1 *Methodologies for OCS-Related Facilities Planning*

Methodologies is designed as a management tool aimed primarily at State officials responsible for developing strategies for managing OCS-related onshore development in frontier OCS areas. This volume consists of three related "methodologies" which address the three questions that are critical to anticipating planning needs:

1) What is the timing and scale of offshore activity likely to be?
2) What kinds—and how many—onshore facilities might be required for a given level of offshore development activity? and
3) Are there potential sites for these onshore facilities—sites which are satisfactory both in terms of industry requirements and the public interest?

It is important to note that virtually all the research and planning activities outlined in these methodologies are conducted in anticipation of actual development. The purpose is to provide a general knowledge prior to specific proposals, not to assess the impact of a single, specific project.

In addition to State planners, local and regional officials may use the method for planning purposes, and the OCS industry may use it for anticipating governmental plans, concerns and criteria. The method has been tested in several New England States and been presented to coastal State and local planners in a nationwide series of regional workshops sponsored by RALI.[2]

Timing and Use of the NERBC Planning Methodologies

The stage of OCS development in a region should largely determine where the user of the planning methodology should begin. If it is still early in the process, it makes sense to begin with Methodology I—working through the entire process of estimating offshore activities—and move on to Methodology II for onshore facilities. These two methods are virtually always done together. If, however, the lease sale is scheduled and an impact statement already prepared, the user may skip them and (relying on the ES) move directly on to Methodology III to identify potential sites and general impacts. Even after a Federal ES, Methodologies I and II may be used to verify projected onshore facilities, estimate offshore and onshore activities for different scenarios, do the same scenarios in more detail, or update the earlier projections made by the user.

Site identification and impact analysis (Methodology III) must come after either scenario development (as in I and II), a Federal ES, or an equivalent projection of OCS activity, which identifies facilities requiring planning.

2.2 *METHODOLOGY I—ESTIMATING OFFSHORE ACTIVITIES ASSOCIATED WITH OCS OIL AND GAS DEVELOPMENT*

The purpose of this first element is to provide planners (and generalist managers) with an understanding of the scale and timing of offshore activity from exploration through field development and production stages. This is a tool for estimating, not predicting, because the large number of unknowns involved in OCS development requires the use of assumptions.

The method uses a scenario approach, based on three components: 1) assumptions—historical trends and reasonable expectations: the starting point is the estimates of recoverable resources made by the U.S. Geological Survey and data on industry operating experience and prospects as provided by Offshore Operators; 2) calculations—eight work elements (with component tasks) which must be done sequentially, resulting in 3) schedules which are:

- year by year schedules of oil and gas finds,
- the number of sales and tracts leased at each sale,
- exploratory rig activity,
- platform requirements for each find,
- a platform installation schedule,
- development drilling schedule, and
- a production schedule for both oil and gas.

Timing/Staff Requirements: The preparation of Methodologies I and II, together—resulting in a report similar to *Estimates for Massachusetts*—will require from two weeks to one month. Calculations take two weeks after all assumptions have been made. A generalist planner or analyst can do it; no specialized skills are required, though familiarity with OCS is desirable. All necessary inputs are available from USGS resource estimaters, BLM environmental statements, environmental reports submitted with exploration or development plans, and the *Factbook*. All calculations may be done manually (with hand calculator).

2.3 METHODOLOGY II—ESTIMATING ONSHORE FACILITIES ASSOCIATED WITH OCS OIL AND GAS DEVELOPMENT

The purpose of this second element is to derive a specific set of facilities—kinds and numbers—which may be sited in a region adjacent to a particular OCS resource province. This too is not a predictive tool, but rather a planning/management tool to gain insights into potentials for onshore facilities—so that the siting and impact assessment of Methodology III can focus on a limited number of likely facilities.

This method uses a *screening process* to identify the types of onshore facilities likely in the region, and *projections of need* to estimate the number (or size) of facilities which are likely. Methodology II relies heavily on the results of Methodology I for the *scale*, and more importantly, the *timing* of possible offshore activities, that is, the quantities of oil and gas discovered and the rate at which they are produced.

Methodology II uses numerous examples and sets of "decision guidelines"—judgments made on the basis of a careful analysis of factors which influence industry's decisions. These factors are presented in the *Factbook (see Section 2.5)*, based on the information provided by the Offshore Operators Ad Hoc Subcommittee established to assist this study. It should be noted, however, that industry practices vary among companies. Finally, it is not possible to predict what will actually happen until a lease sale is made and commercial quantities of oil and/or gas are discovered.

Using Methodology II

Unless the planner already knows precisely which facilities are to be located within the jurisdiction, it is desirable to go through Work Element 1 in its entirety to determine the kinds of facilities likely to be sited in the region, and then determine needs only for likely facilities.

Work Element 1 contains 16 virtually identical tasks, one for each of the 16 onshore facilities or activities shown in *Figure 9*. Each of these tasks asks whether that type of facility is likely in the region, and—if it is—leads to a corresponding work element (from 2 through 16) which estimates the number of facilities likely.

These work elements consider the potential oil and gas production levels, the resulting requirements for facilities, the availability of existing facilities, and the possibility of serving frontier regions from experienced areas—and the critical industry economic factors. The primary sources of information for Work Elements 2 - 16 are Methodology I, the *Factbook*, and industry (e.g., an "offshore operators committee" established in the region).

Timing/Staff Requirements: Use of Methodology II to date has generally been in conjunction with Methodology I, and therefore the two weeks to one month time discussed there includes the Methodology II time. A generalist planner or analyst can easily complete Methodology II.

Figure 9: Relating the Work Elements of Methodology II Onshore Facilities [NERBC]

The products of Methodologies I and II—taken together, as they usually are—have been judged to be extremely useful in the initial trials of the methodology concept conducted by the States of Massachusetts, Maine, Rhode Island and New York. As these two methodologies were being developed, there were two opportunities to try out their concepts, assumptions, calculations and results:

Regional—*Estimates for New England (see Section 2.6)*, prepared by NERBC; and
State—*Estimates for Massachusetts (see Section 2.7)*, prepared by the State CZM Program, with NERBC assistance.

In neither case was the full scenario methodology (as finally published and described above) used, because developing the *Estimates* reports illustrated desirable improvements which were subsequently made in the methodologies. Further, it was possible in both cases to skip or simplify work elements for which information was already available, or for which reasonable assumptions could be made. These documents, therefore, are examples of the kind of forecast which Methodologies I and II are designed to produce, and not precise models of the products any given user will produce.

Figure 9: Relating the Work Elements of Methodology II—Onshore Facilities [NERBC]

WE 1: Work Element 1 - Determine the kinds of facilities likely to be sited in the region adjacent to the resource province under study.
WE 2-16: Work Elements - Estimate the number of particular facilities likely . . .

Task in WE 1	Work Element	Facility	FACTBOOK Page #
1	WE 2	Temporary Service Bases	1.3
2	WE 3	Ancillary Industries - Exploration	10.1
3	WE 4	Permanent Service Bases	1.22
4	WE 5	Ancillary Industries - Development Drilling, and Production Phases	10.1
5	WE 6	Platform Fabrication Yards	8.1
6	WE 6	Satellite Fabrication Yard	(8.1)
7	WE 7	Platform Installation Service Bases	1.44
8	WE 8	Crude Oil Pipelines and Pumping Stations	3.9
9	WE 9	Natural Gas Pipelines and Compressor Stations	3.9
–	WE 10	Pipeline Installation Schedule (1)	3.9
10	WE 11	Pipe Coating Yards	9.1
11	WE 12	Pipeline Installation Service Bases	1.44
12	WE 13	Gas Processing and Treatment Plants	5.1
13	WE 14	Onshore Partial Processing Plants	4.1
14	WE 15	Refineries	6.1
15	WE 16	Marine Terminals	3.47
16	(2)	Oil Company District Offices	11.1

(1) Only developed if Tasks 8 or 9, WE 1, are affirmative
(2) The number and kind of district offices are virtually impossible to project.
NOTE: Methodology II does not consider petro-chemical plants, although it is covered in the *Factbook*.

2.4 METHODOLOGY III—SITE IDENTIFICATION AND IMPACT ANALYSIS[3]

Methodology III is a systematic procedure for identifying alternative sites for the onshore facilities associated with OCS development—sites which are capable of both meeting industry's basic requirements and satisfying public policy criteria for facility development. NERBC designed the methodology to:

1) include planning as well as impact analysis,
2) be *efficient*, focusing limited State staff and resource on only those sites capable of supporting development,
3) be *open and flexible*, reflecting the political sensitivity of the issue,
4) be *anticipatory*, capable of being applied even before OCS exploration begins in a region,
5) be *iterative*, able to be updated repeatedly as exploration proceeds and information improves, and
6) conform to and apply the information, goals and guidelines of state programs developed under the Coastal Zone Management Act of 1972.

This methodology assumes that States will choose to guide development rather than simply respond to it, and that this approach will enable them to deal confidently with OCS-related industries as exploration and development proposals emerge.

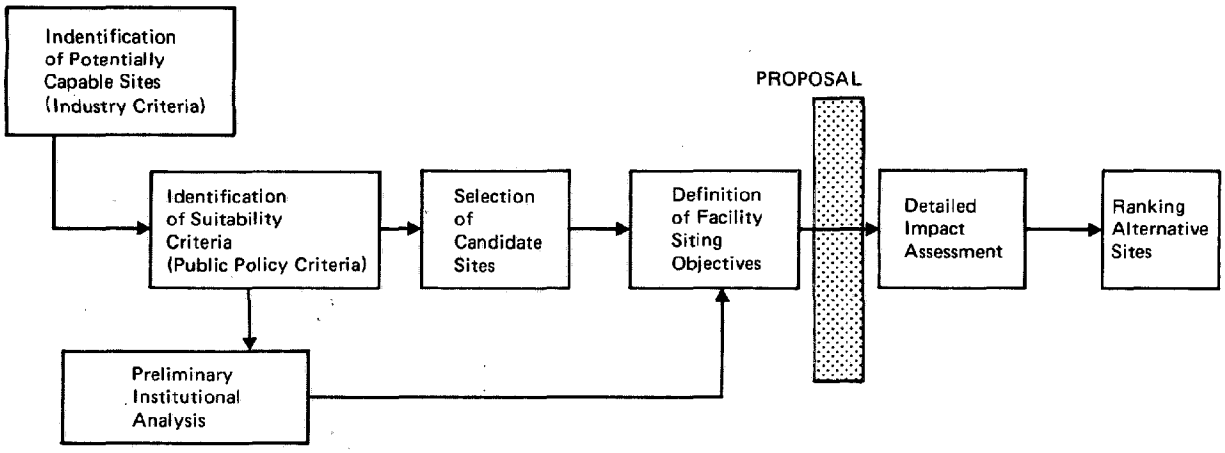
Format of Methodology III

According to the Massachusetts CZM agency, the format of the site identification and impact analysis is "organized common sense, practical and easy to use." Each of the 19 work elements addresses a specific planning or decision-making activity. Taken together, they supply a framework for a rational process of OCS-related facility site planning and assessment. Listing the work elements and assigning numbers does not mean there is a simple linear process, however. The elements may be shifted, skipped or given more/less attention. The sequencing and responsibility for a given work element will vary from state to state, and will be likely to reflect political realities as well as the simple rationality of a planning methodology.

The 19 work elements have been organized as a series of seven discrete but related "modules" or building blocks—groups of tasks designed to yield certain products, as shown in *Figure 10.*

Figure 10: Planning Process Flow Diagram [NERBC]

Source: New England River Basins Commission.



It is assumed that Modules 1-5 will be completed prior to receipt of specific development proposals, and that Modules 6 and 7 would be completed after a proposal emerges (or if the State choses to acquire and develop sites). Viewing Methodology III in this modular format has several benefits. First, it recognized that different agencies may be involved in different tasks. Identifying capable sites is an essentially technical task and can be performed by state planners. Analysis of laws, plans and policies as they affect OCS development (Module 3), on the other hand, is clearly a matter of public policy and must involve policy-makers.

In addition, the modular approach re-emphasizes the notion of substitutability. Many states have already completed work suggested in one or more modules (e.g., through preparation of the coastal management program); in addition, some modules may be irrelevant in some cases. The modular approach also provides for a number of points of entry and exit from the process—allowing for shifting priorities, delays in OCS development, and so forth.

The purpose, staffing and estimated timing of the modules in Methodology III are as follows:

Module 1: *Identification of Potentially Capable Sites* (Industry Criteria)
Directed at the identification of areas or sites capable of meeting the basic siting requirements of each OCS-related facility likely to be developed, as identified in Methodology II. May be done by general or technical planners; estimated to take one and one-half to three weeks to accomplish.

Module 2: *Identification of Suitability Criteria* (Public Policy Criteria)
Distinguishes between *capable* sites, that is, those which meet industry's needs, and *suitable* sites, those which seem to be in the best interests of the State or community involved. This module should be addressed by State or local officials with policy responsibilities; may take several months to accomplish.

Module 3: *Preliminary Institutional Analysis*
Assesses the adequacy of the State's industrial facility siting authorities and procedures very early in the planning process. Should be done by policy staff; may take one month or more.

Module 4: *Selection of Candidate Sites*
Combines the results of Modules 1 and 2 in order to identify areas or sites which qualify as "candidate sites." May be done by a combination of technical planning and policy staffs; requires about one week per facility.

Module 5: *Define Facility Siting Objectives*
Develops strategies and legal authorities to assure that the State (or community) has the power to get what it wants in OCS-related development. Requires three to five days for Work Element 12, with 13 and 14 time uncertain.

Modules 1 through 5 are designed to be completed in anticipation of development. Modules 6 and 7 are reserved until specific proposals are made.

Module 6: *Detailed Impact Assessment* (Environmental, Economic, Fiscal, Social)
Designed to yield the kinds of technical information required for State and community impact assistance under CEIP, and to develop strategies for maximizing benefits and minimizing costs at each candidate site. By both technical and policy staffs; time cannot be estimated. See WESTON, CF and MARYLAND sections on impact assessment.

Module 7: *Ranking Alternative Sites*
Designed to provide a method of evaluating and ranking the acceptability of the proposed facility at each candidate site based on benefits and costs, and the degree to which costs can be offset by mitigation measures. By both the planning and policy staffs; time cannot be projected.

The primary sources of information for these work elements will be:

- Results of scenario development (Methodologies I and II)—the driving force of likely facilities for Work Element 1;
- The *Factbook* for technical information on industry site preferences and requirements; and
- State coastal management programs, for inventories, site capability analyses, policies, criteria, plans and programs.

2.5 *FACTBOOK: ONSHORE FACILITIES RELATED TO OFFSHORE OIL AND GAS DEVELOPMENT*

In addressing the sole initial NERBC task of developing a planning methodology, the project became more complex than envisioned because of the lack of coherent information about the process of offshore development and the onshore facilities involved. Consequently, the NERBC staff first produced the *Factbook*, a encyclopedic reference work on the principal onshore facilities, which has become a primary nationwide data source for facility characteristics, requirements and impacts. Information came from extensive contacts with offshore industries, and the NERBC/RALI project subcommittee of the Offshore Operators Committee of the American Petroleum Institute (API). Intensive research was done into experiences in the Gulf of Mexico, California, Scotland and elsewhere in the world with offshore oil and gas development.

The *Factbook* is massive, totaling at least 750 pages, but the bulk should not scare you—it is designed to be used as an encyclopedia, and never read straight through. A user need read only the section for the facility or impact of interest. Each facility chapter has three sections:

- *Description of the Facility*—a detailed description of the facility and the activity or processes that take place there.
- *Timing, Trends and Options in Facility Siting*—a discussion of the factors that influence, and the steps involved in, siting in a frontier area.
- *Siting Characteristics, Requirements, and Impacts*—a comprehensive description of land, waterfront, water, energy, transportation, labor, and capital requirements; site alteration and construction impacts; and environmental impacts—air, wastewater, sedimentation and runoff, solid waste, noise, aesthetics.

Facilities covered within the *Factbook* are, by section and number of pages:

1—Service bases (temporary, permanent, and those supporting platform and pipeline installation—47 pages;
2—Repair and maintenance yards—10 pages;
3—Transportation facilities (transportation strategy—5 pages; pipelines—38 pages, and marine terminals—55 pages);
4—Partial processing plants—50 pages;
5—Gas processing plants—35 pages;
6—Refineries—52 pages;
7—Petrochemical plants*—69 pages;
8—Platform fabrication yards (steel and concrete)—49 pages;
9—Pipe coating yards—35 pages;
10—Ancillary industries*—8 pages;
11—District offices*—6 pages; and
12—Land pipeline systems*—73 pages.

* - These chapters were completed in 1978 and distributed in separate *Tech Updates* #20, #12, #13 and #14, respectively.

Much of the detailed and generic information on impacts is in the Appendices:

A. Impacts of the Major Pollutants—air emissions, noise, water, water discharges, hazardous solid wastes [64 pages]
B. Impacts of Site Alterations [17 pages]
C. Vehicle Air and Noise Emissions [5 pages]

A descriptive summary of each facility, with siting requirements and environmental emissions, was prepared by NERBC for publication in Chapter II—Offshore Activities and Onshore Facilities—of the *Source Book: Onshore Impacts of Outer Continental Shelf Oil and Gas Development* (The Conservation Foundation, 1977—*see Section 5.6 #1 of this Guide).* An example of one of these summaries is presented as *Figure 11.*

2.6 *Estimates for New England*

The second of the NERBC/RALI Project reports, *Estimates for New England* presents detailed scenarios of offshore activities and onshore facilities which might be expected in New England from three sizes of oil and gas discoveries on the Georges Bank. The report has six chapters: introduction, summary of each scenario and estimated direct impacts, assumptions used in developing the three scenarios, the high find scenario in detail, the medium find scenario, and the no-find scenario.

Both the high and medium find scenarios have the schedules derived from the eight work elements of Methodology I listed in *Section 2.1.* The no-find scenario, of course, has no schedules after the exploratory rig activity. Each scenario projects the type, number and timing of onshore facilities determined through Methodology II. *Figure 12* displays the results of this methodology for the high find scenario.

For each type of facility identified in the scenarios (10 types of facilities for high find, 7 for medium find, and 1 for no find), *Estimates for New England* presents the appropriate assumptions and impacts contained in the following lists:

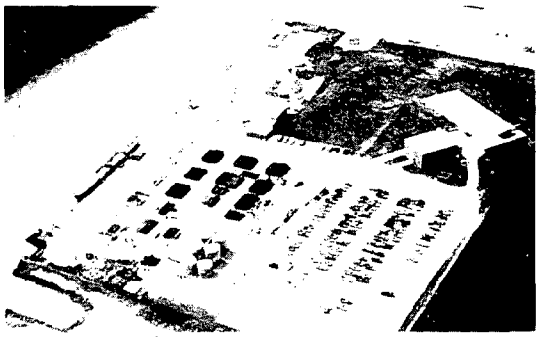
Assumptions - existing facilities, location, materials to be delivered, transportation, berth and wharf space, construction/installation time, capital investment, raw materials, water use, energy, employment, wages, air emissions, wastewater, solid

Figure 11: Example of NERBC Facility Description in the Source Book
Source: New England River Basins Commission, as published in the Conservation Foundation's *Source Book*

5 Permanent Service Bases

Heliport near service base
Source: Mass. CZM

Wharf space at the service base
Source: Exxon USA



Permanent service base

Description

The permanent service base provides essentially the same logistical support and services during the development phase as the temporary base does during the exploratory phase. However, the fact that as many as 50 wells can be drilled from one platform and that one company's success will stir up increased activity by other lease-holders causes the size and intensity of required support and services to increase dramatically during development.

Facility Siting Considerations

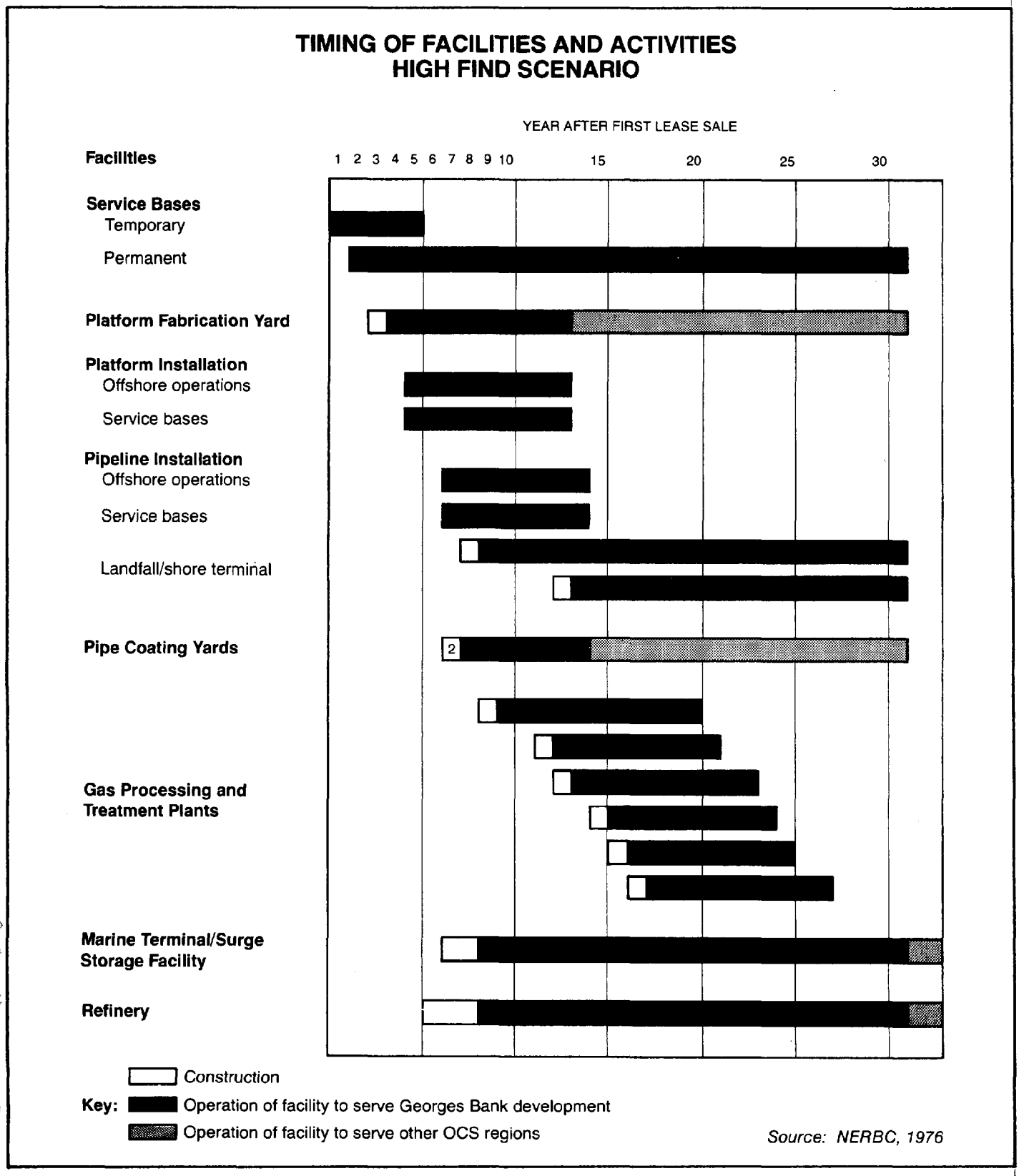
As with temporary bases, the siting of permanent service bases is influenced by distance, cost, land availability, public attitude, available harbor facilities, and social facilities. In some cases, the location of bases established during exploration may prove convenient for the development phase and a larger area may be purchased or leased on a long-term basis. However, if the field is distant from the temporary base, a more convenient site may be developed. (There is no evidence to suggest that choice of a site for a permanent base indicates a likelihood for colocation of other OCS-related facilities.) Wherever possible, companies will choose a site where some social infrastructure, particularly entertainment, is available, both in order to retain employees and reduce the likelihood of unionization.

Requirements and Impacts

Land	25-50 acres on all-weather harbor: 10,000 sq. ft. for permanent office and communications space; 1 acre/platform for helipad; remainder for warehouses and open storage.
Waterfront	200 ft. of wharf/platform; 15-20 ft. water depth at pier.
Water	8.2 million gallons/platform/year during development drilling. Little during production.
Fuel	54,000 barrels of fuel/platform/year during development. 19,200 barrels of fuel/platform/year during production.
Labor	50-60 jobs/platform during drilling; 50% local initially, rising to 80% local.
Wages	Approx. $1 million; average wage $17,000.
Capital Investment	$1-3 million.
Air Emissions	Hydrocarbons from fuel storage and vehicle operation.
Wastewater Contaminants	Hydrocarbons, heavy metals from bilge and ballast water.

Figure 12: Example of Facility Projections in Estimates for New England [NERBC]

Source: New England River Basins Commission



waste, economies of scale—with much of the information coming from the *Factbook*; and
Impacts - production or activity rates, raw materials, boats and helicopters, energy use, water use, land use, berth and wharf space, capital investment, employment and wages, sales revenue, air emissions, wastewater, ballast water, noise, solid waste, with summary.

2.7 *Estimates for Massachusetts* [By State]

A field test of Methodologies I and II was made by the Massachusetts Coastal Management Program (with NERBC assistance), projecting the numbers and kinds of facilities that might come to Massachusetts from Lease Sale #42—Georges Bank. The process involved two steps: (1) calculation of an offshore scenario, and (2) calculation of the levels of onshore activity necessary to support those offshore activities. The resulting 50-page (double-spaced) report, *Estimates for Massachusetts*, is described in pages 7-13 of the fourth NERBC report, *Case Studies in OCS Planning (See Section 2.8).*

The offshore scenario (based on a more recent USGS resource estimate than that for *Estimates for New England*) was presented in eight pages, showing assumptions, total estimated offshore activity, and the offshore activities projected to be serviced from Massachusetts. Using the results of Methodology I—and assuming a transportation strategy of tankers for oil and pipelines for gas—several detailed schedules of onshore activities were produced. Because of competition from neighboring states, it was assumed that Massachusetts would support eight percent of exploratory drilling and 20 percent of development drilling, plus all helicopter and gas processing activity (it is the closest landfall).

The 40-page onshore scenario chapter was organized by facility: (1) temporary and permanent service bases, (2) heliports, (3) platform installation and (4) pipeline installation service bases, (5) pipe coating yard, and (6) gas processing plants. Each section provides a general description of the facility, its activities, and its potential impact on Massachusetts.

Using information provided in the *Factbook* on locational preferences of the facilities involved, they were divided into two groups: "Likely"—those certain or almost certain to locate in the state, such as heliports and gas processing plants; and "possible"—those which might or might not locate in the state, such as pipeline installation bases.

One of the most valuable products to come out of preparing *Estimates* was a clearer understanding on the part of the State staff of how OCS industries operate in siting onshore facilities, including requirements, tradeoffs, impacts and flexibility of the various types of industries and activities involved. This increase in understanding is underscored by improvement in time required to prepare the offshore/onshore scenario: three weeks for the first attempt and only four days for the second (based on revised resource data).

Estimates for Massachusetts has been used for at least four purposes:

1) Guidance for OCS-related businesses—especially for out-of-state firms to locate sites, and for in-state firms to identify how and when their services might be required; used by the state Department of Commerce and Development.
2) Evaluative tool for the Coastal Energy Impact Program (CEIP)—to review, and justify increases in, the planning funds, based on documented projections of OCS-related employment.
3) Planning tool for the Massachusetts CZM Program—especially in defense in court suits on the 306 program, demonstrating that sites are available for oil and oil-related facilities.
4) Public information resource—for cabinet officer's speeches, calls from the press and State reports.

2.8 *Case Studies in OCS Planning*

Four states have applied elements of Methodology III—Site Identification and Impact Analysis: Massachusetts wanted to identify all the facilities that might be attracted to the state and to examine the siting possibilities of its entire coastline. Maine wanted to examine its entire coastline, but for just one facility. Rhode Island examined one site in detail to identify all the facilities it might attract. And finally, New York chose to simply document the characteristics of available developable sites. Each of these applications is summarized below.

Massachusetts: A preliminary survey of potential sites within Massachusetts for the "likely" facilities identified in *Estimates for Massachusetts* (Methodology II) resulted in the 71-page report, *A Preliminary Analysis of Capabilities for Siting OCS Related Facilities in Eastern Massachusetts: Service Bases, Gas Processing Plants and Heliports* (1977), by the State CZM Program.

Priority for analysis was given to *service bases*, as the state has several ports close to the location of OCS leasing, and service bases are the earliest facilities to be required. The threshold criteria for initial screening was channel depth of 15′ or greater. Seven ports meet this criteria; profiles were prepared of non-threshold information, but the effort to rank ports proved futile because of the lack of sufficiently detailed information. Further information was gathered on State CZM development and conservation policies.

Second priority was given to *gas processing plants.* The examination of alternative locations followed essentially the same methodological path as the service base analysis, but merged the State policy criteria with industrial criteria. Fifty-one communities met the criteria requiring location along or near an existing or proposed pipeline route, but only 12 of these met the further need for ample water supply. A brief analysis of *heliports* showed that three locations met the selected criteria of using an existing airport closest to the oil field, highway access, and scheduled air passenger service.

In terms of Methodology III, the State performed Module 1 (industry criteria), relied on the existing CZM program for Module 2 (public policy criteria), and did not do Module 3 (institutional analysis) because of the preliminary nature of the test. This preliminary siting analysis proved useful to the State for several reasons: (1) it identified logical ports, (2) it eliminated "sleeper" ports that had not been considered, and (3) it highlighted the need for more and better site-specific information on developable land. In summary, the State determined *what* facilities they would be concerned with and *where*, in general terms, they might be located.

Maine: This test was an analysis of the entire coastline of Maine for alternative sites for one type of facility: a deepwater marine oil terminal. The threshold criteria chosen was water depth of at least 75'; 15 sites met that criterion and tables of information were prepared for each. Next, as part of Module 2, the State Planning Office staff drew up a set of eight policy alternatives. The final step was to compare the site characteristics and evaluate the sites based on the alternative policy criteria. Module 3 was not addressed in this test.

The Maine test demonstrated that at this early stage in the siting process, it is important to identify the critical or "threshold" criteria for the facility from industry's viewpoint, e.g. water depth. These critical criteria are used to identify potential sites (and eliminate non-potential), while non-critical criteria are used to evaluate and compare potential sites. In general, physical criteria are more important than socio-economic in the process of selecting potentially feasible sites.

Rhode Island: The State of Rhode Island wanted to examine one site—the Quonset Point/Davisville former naval base—to identify all the potential OCS facilities it could attract. This information would support the master development plan for the site, consisting of a facilities study outlining three development scenarios, an environmental assessment and a socio-economic assessment. The State Planning Office and its consultants used *Estimates for New England* to obtain estimates of resources, facilities and employment; and the *Factbook* to understand the process of industry siting decisions and locational requirements, and to roughly estimate development costs and environmental impacts.

New York: The State of New York was primarily concerned with the capability of sites in the New York metropolitan area to serve OCS activity in both the Georges Bank and Baltimore Canyon lease areas. The Department of Environmental Conservation produced the report, *New York State and Outer Continental Shelf Development: An Assessment of Impacts* (October 1977). *Estimates for New England* was used to develop three different, New York-relevant, scenarios of possible finds. The numbers and kinds of facilities were based on the "Timing, Trends and Options" sections of each facilities chapter in the *Factbook*. The *Factbook* also provided the evaluation criteria for site development opportunities identified by the New York Port Authority in its May 1977 analysis, *Support Bases for Offshore Drilling: The Port of New York Potential.* New York's main interest in OCS activity—since any potential facilities would have barely perceptable impact on jobs, income or environment—relates to waterfront redevelopment potentials, promotional value, and energy supply implications.

ACKNOWLEDGEMENTS

William Doyel of the Resource and Land Investigations (RALI) Program. U.S. Geological Survey served as Technical Officer for the project, assisted by Philip A. Marcus.

The Study Manager for the New England River Basins Commission (NERBC) was Vincent A. Chiampa. Irvin M. Waitsman was the Technical Chief of the project, and had principal responsibility for the *Factbook* and *Estimates for New England*. William E. Nothdurft designed and co-authored all of the project reports. He and Philip A. Marcus jointly prepared Methodologies I and III of *Planning Methodologies;* Waitsman and Fred Babin prepared Methodology II.

Further information on the NERBC/RALI reports may be obtained from

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CHAPTER 3: WESTON—Methodology for Assessing Onshore Impacts of Offshore Outer Continental Shelf Oil and Gas Development

The WESTON method provides a comprehensive forecast of offshore activities and onshore facilities, and a general assessment (prior to specific proposals) of the full range of onshore impacts. A strength of WESTON is that, in contrast to the two other principal studies, it provides alternate methods of assessing onshore environmental, economic and fiscal impacts—ranging from simple-to-do to detailed in results. The report was prepared by Roy F. Weston, Inc., in association with Frederick R. Harris, Inc. and the University of Delaware Center for Policy Studies. The National Science Foundation (NSF) was the lead contracting agency, with funding support from the Bureau of Land Management (BLM)—Department of the Interior, and the Office of Coastal Zone Management (OCZM), National Oceanic and Atmospheric Administration (NOAA)—Department of Commerce. Technical assistance was provided by Interior's Office of Policy Analysis.

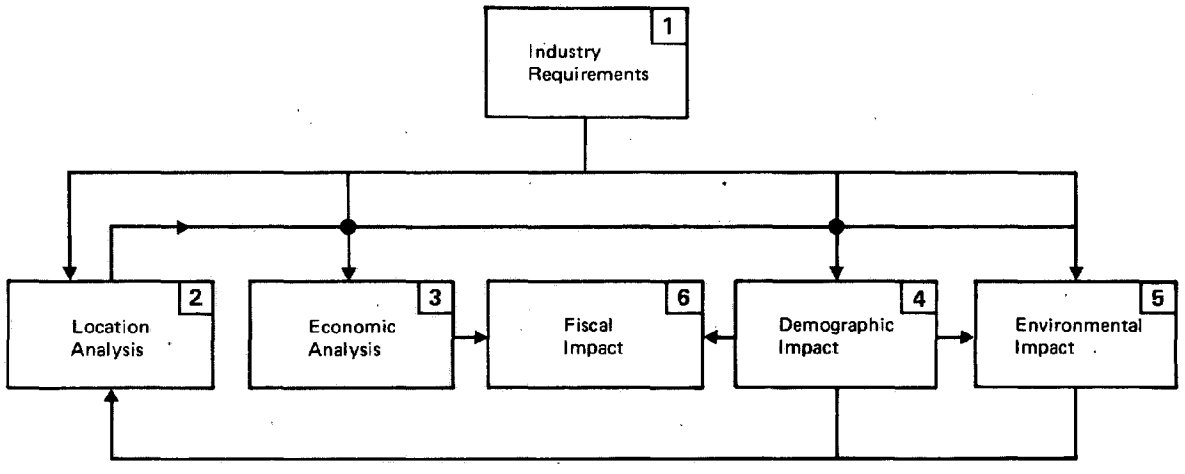
The primary objective of the WESTON method is to offer guidelines for obtaining early projections of future significant activities. It is not considered a substitute for the extensive analysis and planning efforts ultimately accomplished by the oil companies or the more detailed, site-specific studies being conducted by several State coastal management programs. State level planners and Federal agencies are considered the primary users, with county level (and sub-State regional) planners also likely users. Local planners are not considered likely users, as the results of the method generally do not focus on a local level.

While the WESTON method appears to be the most complex of the three principal ones, that is not necessarily so. The user needs to be somewhat sophisticated to understand it (because there is less explanation than in the other two), but not to use it. WESTON has gone further than any other method to provide all the information necessary to complete the analysis of onshore impacts. Going through the Industrial Requirements methodology, for example, requires limited outside data and simple calculations. In fact, the entire process can be done on a hand programmable computer, as described in WESTON's Volume III.

Organization of the Report

The planning and impact methodologies are presented in three volumes which work well together. The key document is Volume II—*Methodology*, which contains the six major elements of the WESTON method. Volume I is designed as an introduction to the study—for potential users to determine whether they want to use all or part of the methodology. Volume III puts the methodology developed in Volume II to a test in the Baltimore Canyon. *Figure 13* shows the internal relationship of the six elements of the Volume II *Methodology*.

Figure 13: Relationships of the WESTON Method



3.1 *Volume I—Introduction*

Designed as a primer or executive summary for the entire method, Volume I contains a description of the elements of Volume II, characteristics and assumptions of its six chapters, and a description of the assessment process. Issues, limitations, constraints and problems are also discussed in Volume I, as well as level of application, and time and skills required.

Once Volume I has been examined—and a decision made to go ahead with using the *Methodology*—this volume is no longer necessary except as a possible reference. It may, of course, be used by a planner to help explain to policy makers/elected officials what the WESTON exercises are all about.

3.2 *Volume II—Methodology*

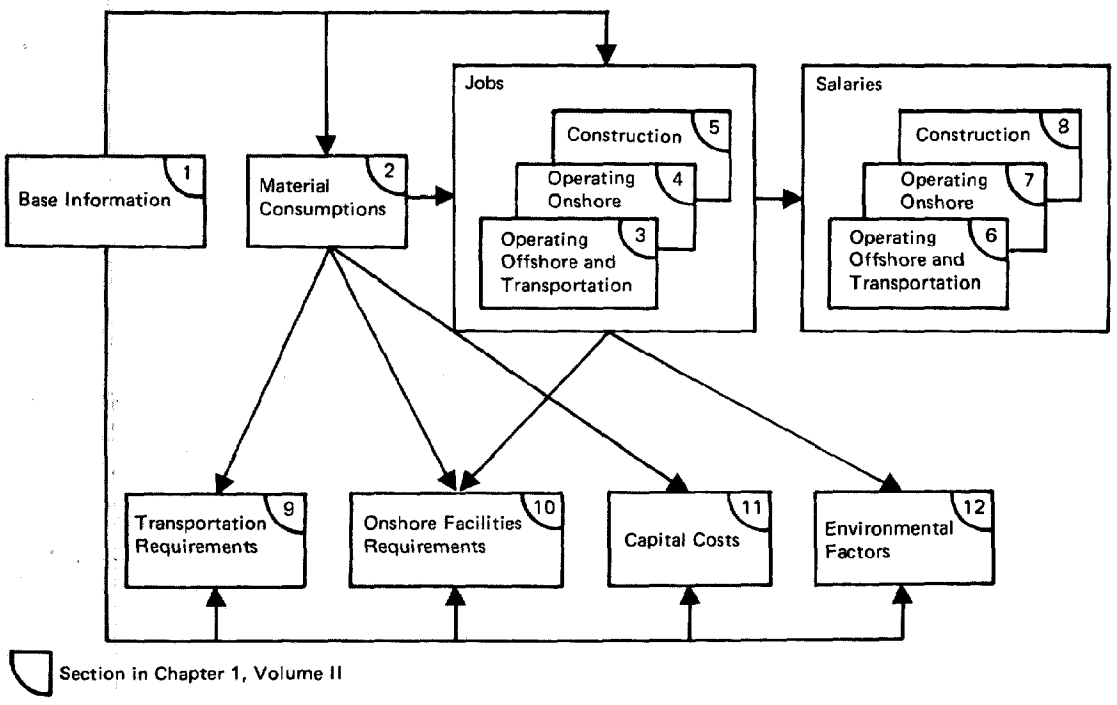
The six elements of the Methodology as shown in *Figure 13* are described in the following six *sections*. Applying the full range of *Methodology* (Chapters 1 - 6) can take six to eight analyst-weeks for a well qualified group skilled in the comprehensive planning process. The greatest amount of time would be spent on the Location Analysis (Chapter 2), and possibly Environmental Impact (Chapter 5).

3.3 *Industrial Requirements* (Volume II, Chapter 1)

The products of Chapter 1 are time profiles of resource recovery, and associated jobs and salaries, material, land and resources, and capital investment. This is, quite simply, the quantitative base for the entire study. While results flow immediately into the Location Analysis, they ultimately drive the economic, demographic, fiscal and environmental methodologies.

Base Information (Section 1.1) creates the offshore scenario (similar to Methodology I in NERBC), with the remaining eleven sections translating this information into offshore effects (similar to NERBC's Methodology II). Movement of data among these sections—and the resulting products—are shown in *Figure 14*. Each section of this chapter consists of a series of tables and graphs, from which appropriate information is entered directly onto the section's Impact Assessment (or Base Information) Summary Sheet. Section 1 defines time-phased mobile drilling activity, development production scenarios, platform installations, oil and gas production, and well workover schedules. The only information the analyst must provide is the estimated reserve (from USGS), the number of tracts offered for lease (from BLM), the tracts sold, the size of the find, or more current base information. The analyst, therefore, does not require a sophisticated understanding of the OCS process, but should have good calculating skills, being quite meticulous in "cracking out" the numbers. A scenario can be done in a few days.

Figure 14: Flow Chart in Determining Industry Requirements [WESTON]



In testing the method—Volume III—WESTON developed a program which is useable on a programmable hand computer (HP-67 or equivalent), which will reduce the time required for determining Industrial Requirements. The six specific programs which accomplish this are written out and fully described in Chapter 1 of Volume III. *The potential user should review Volume III before creating an Industrial Requirements scenario.*

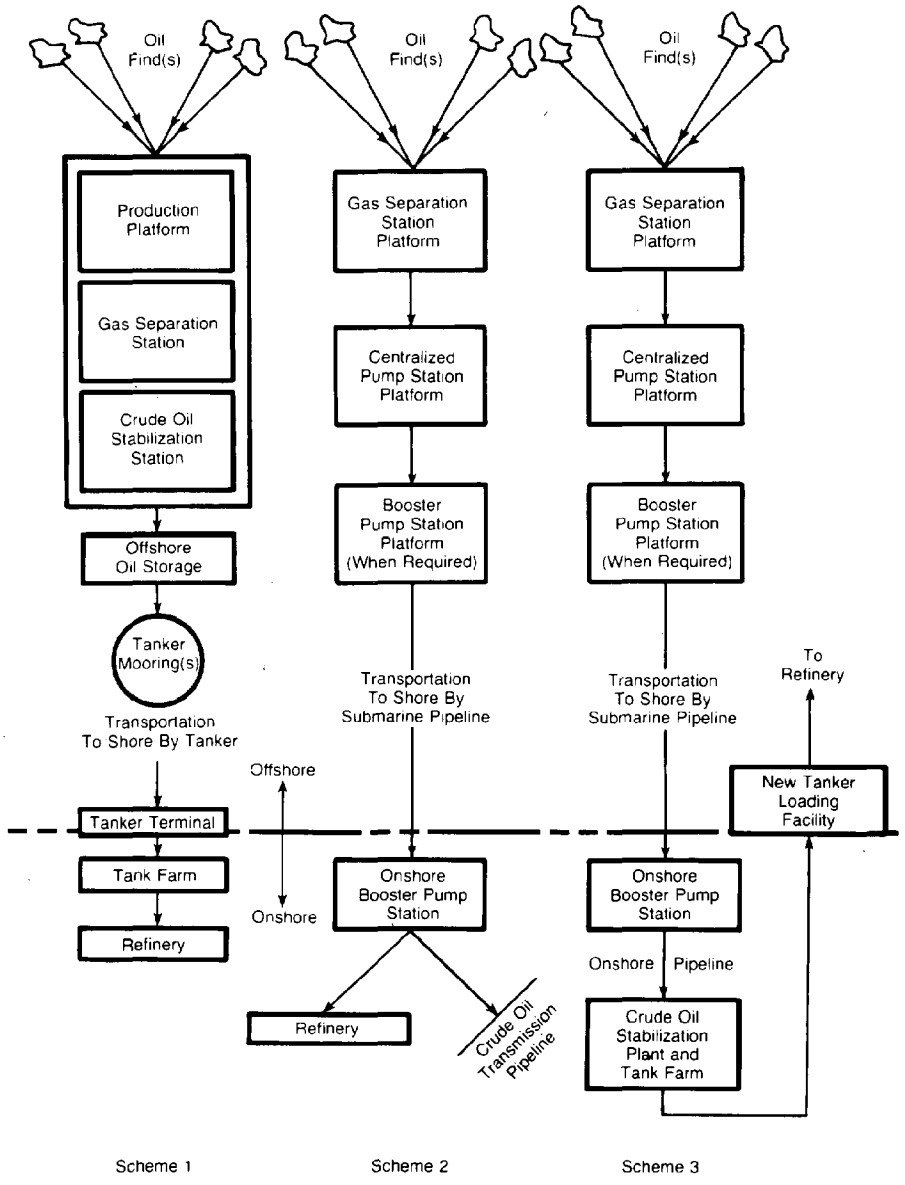
In line with its approach of providing complete information from which the analyst can choose the appropriate data, WESTON presents three alternative transportation schemes for both oil and gas. The alternatives for oil, for example, are shown in *Figure 15.* The choice of schemes has a significant effect on the types of facilities to be considered.

The remaining sections of *Chapter 1* use the Section 1.1 offshore summary information to generate the spectrum of onshore activity demands (as appropriate for the facilities listed earlier in *Figure 5*):

1.2 Materials—tubular steel, cement, mud, fuel, fresh water and food; personnel projections (from the level of offshore activity) for both offshore drilling/production and transportation (e.g., service boats) which may be considered part of service base employment;

Figure 15: Crude Oil Transportation Scheme [WESTON]

Source: Roy F. Weston, Inc.



1.3 through 1.8—Jobs and salaries for operating offshore, operating onshore, and construction through all phases; both jobs and salaries are divided into administrative, professional, skilled and unskilled;
1.9 Transportation—requirements for boats and helicopters;
1.10 Onshore Facility Requirements—land, electric power, and water;
1.11 Capital costs; and
1.12 Environmental factors—liquid wastes, sanitary and solid wastes, tanker terminal wastes, and ballast waste.

This chapter projects numbers of activities/facilities only in rigs, platforms, and temporary and permanent service bases. For all other facilities, the chapter projects the total number of employees, production rate, and/or land requirements for the entire leasing region. The result of the Industrial Requirements chapter is a whole set of profiles of production, employment and land used. Examples of these profiles are presented in Volume III—*Baltimore Canyon Test Case (See Section 3.9).*

"The time to work the Industrial Requirements methodology is *now,* whatever the stage of development," according to the authors of this report. The whole method is designed to be a dynamic one, that is, one in which the initial assumptions and information are continually updated with the results of exploration. Furthermore, the user is provided a great deal of flexibility in being able to create any number of scenarios, e.g., no find, finds of varying sizes, finds with differing industry practices, and alternative transportation schemes.

3.4 *Location Analysis* (Volume II, Chapter 2)

The Location Analysis developed is a systematic approach to identifying probable (or most likely) locations for primary and secondary onshore facilities. For each type of facility covered by this methodology *(See Figure 5),* there is a flow diagram which outlines the process of identifying and ranking alternative sites and identifying environmental constraints. The critical elements of the process are the decision points and checkpoints, as shown, for example, in *Figure 16,* the flow diagram for service bases.

The process starts with a large number of potential sites, many more than are needed. An analysis of "threshold" requirements—those so critical that, if not met, the site is eliminated—will reduce the number of sites for further consideration. For example, if water depths are not sufficient for a particular use, all other attractive features of the site are irrelevant. Although locational decisions start out basically as a function of the economics of transportation, numerous other criteria ultimately play a role in the selection process. The WESTON methodology identifies such locational factors and incentives/disincentives to selecting a site. For example, if at all possible, oil companies will try to locate onshore facilities where they are welcome and avoid those areas where there is local opposition.

The analyst will have to obtain the needed locational information from Federal, State and local sources; and make judgments about the importance of each factor. WESTON's Location Analysis method is not integrated; that is, a separate analysis is done for each facility or set of similar facilities. Since the sources of information for each type of facility (and each chapter in the methodology) are generally the same, the analyst will want to consider combining the data collection process.

The analyst running the Location Analysis should have general planner skills, with an emphasis on physical environment (e.g., geography) rather than a basic land use planning background. The level of effort for the analysis varies significantly, depending upon the scale of the area covered, the types of facilities, the availability of data, and the desired level of detail. In many cases, the land capability information has been assembled and evaluated as part of the coastal zone management program, and does not have to be "re-invented" for this analysis.

Location Analysis should be done immediately after the Industrial Requirements method to get a rough idea of likely sites. It could be updated in two years or so, in any case after exploration results are in. The results of this analysis, in data files and on maps, are used for the assessment in the four impact methodologies: Chapters 3-6. It is entirely possible that the Location Analysis will be modified by the results of the Chapter 3-6 impact analyses.

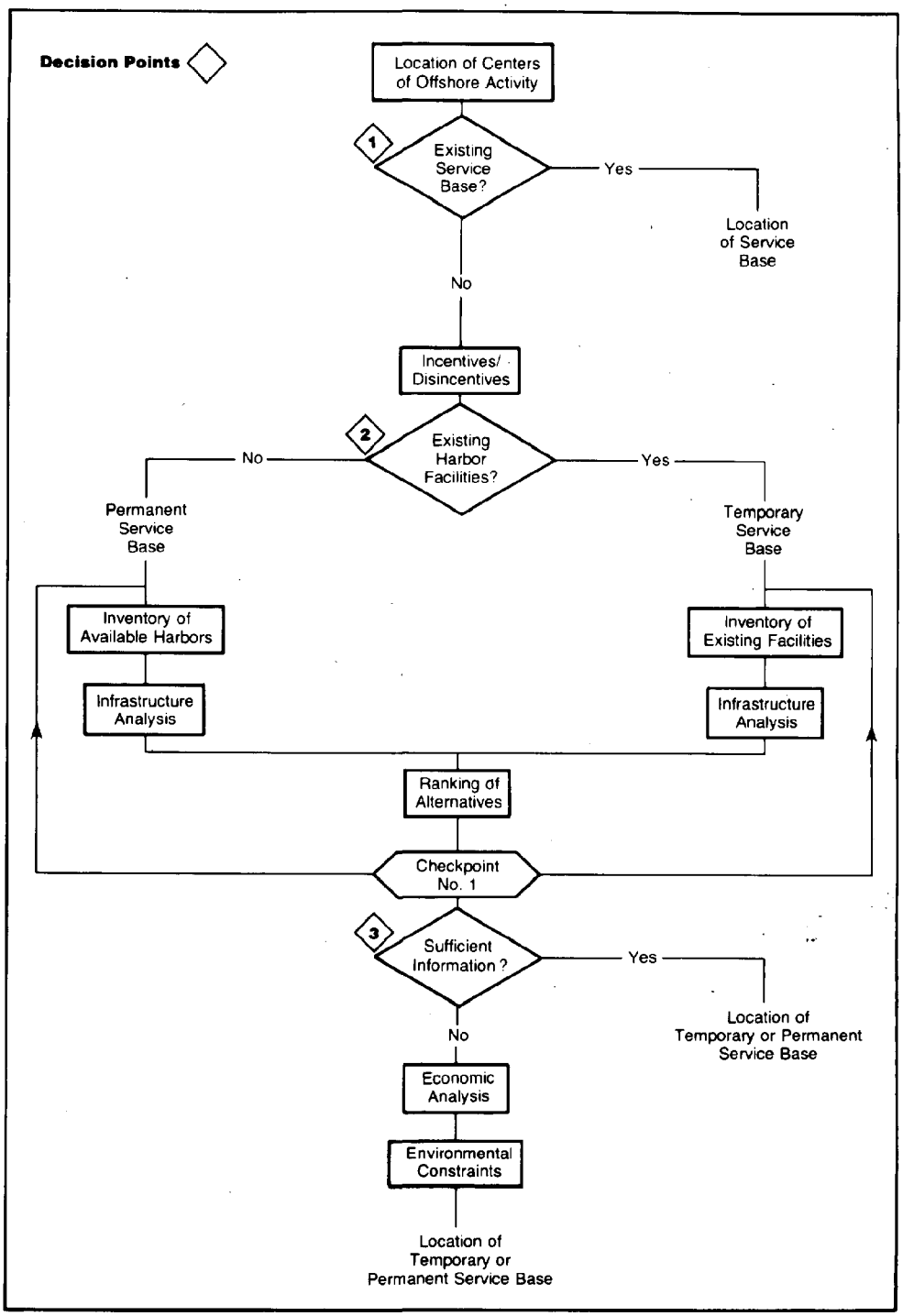
3.5 *Economic Analysis* (Volume II, Chapter 3)

Economic Analysis is the first of the four impact evaluation chapters. WESTON's approach is to provide a wide range of methodological options, responsive to such factors as the availability of skills, availability and quality of data, time and level of effort available, and level of desired accuracy. For each impact evaluation, the method used is to project, and then compare, two levels of activity: (1) baseline values, without OCS development, and (2) projection of values with OCS development. The difference is then considered the "OCS impact."

Economic Analysis is designed to forecast the OCS-related effects on output, earnings, employment, and the use of land and resources. The chapter starts with a thorough discussion of the issues and difficulties of economic analysis. Among these is determining the area of impact. WESTON generally assumes that the region affected will be the Standard Metropolitan Statistical Area (SMSA) or the non-SMSA portions of the Bureau of Economic Analysis (BEA) regions.

For establishing baseline values, WESTON uses the OBERS[4] projections because they are widely known, frequently used, generally available, and consistent. Products of OBERS are population, employment, earning, and personal income. A general procedure for updating the OBERS projections is provided. From these OBERS numbers, WESTON demonstrates a procedure for estimating employment by industry, incomes by families, by income distribution, land use, water use, energy use, and capital and infrastructure requirements (i.e., public facilities).

Figure 16: Service Base Flow Diagram [WESTON]



Source: Roy F. Weston, Inc.

For estimating impact values, WESTON provides two types of methods:

1) A method for translating the physical requirements of OCS development (e.g., miles of pipe and number of employees—generated in Chapter 1) into monetary values allocated to the specific standard industrial code (SIC) code industries. The procedure for this is provided in a complete, 17-page WESTON workbook.
2) Methods for estimating indirect and induced output effects from primary impacts. One of these is the sophisticated Curtis Harris input-output (I/O) model, for which WESTON provides a six-page description (summarized in *Section 5.5*). A somewhat less sophisticated multiplier model can be developed from an estimated I/O model for the region. A simple version is the Regional Industrial Multiplier System (RIMS) developed by BEA. The requirements of this method are minimal, calling for a few basic ratios from the analyst. WESTON provides a one-page description of RIMS and a 54-page workbook for using it. The products of RIMS are regional outputs and earnings by industrial sector.

The first method covers a State or larger region, with most data at the BEA level. The Harris model provides results at the State and county level, while the RIMS results can be at the State, county or local level.

This section concludes with WESTON methods for converting output impacts by industry to employment impacts by industry, and for projecting occupational and family income distribution. Finally, a gravity model—calling for a high degree of analyst judgment—is used to distribute the impacts throughout the region.

The time required for the Economic Analysis depends on the size of the area, the method used, and the availability of data. The detail shown by the WESTON methods is probably much more than most users will want or need. WESTON cautions that the analyst be selective, only using an appropriate level of effort and detail.

3.6 *Demographic Impact* (Volume II, Chapter 4)

This chapter translates the employment projections of Chapters 1 and 3 into population changes and resulting demands on infrastructure and community facilities. Population characteristics considered in this chapter include: population location and density, population change, migration pattern, urbanization, and composition.

The baseline projections may be made by using OBERS employment and population forecasts for States, SMSA's and non-SMSA counties. Many States, however, have developed their own projection systems, which WESTON identifies in a complete 5-page table. Methods of projection described in the chapter include: cohort-survival, migration and natural increase, forecasts based on larger areas, and employment based methods. Various models are presented for allocation of projections to less than the county level, including the EMPIRIC Activity Allocation Model, Incremental Projective Land Use Model (PLUM), and county projection models. Special attention is given to a cohort survival and linked employment-migration model.

To project population and demographic characteristics with OCS activity, the analyst will use the same models or methods as for the baseline projections, adding basic employment information from Chapter 1 and secondary employment information from Chapter 3. This employment induced population increase can be translated into: housing demand and associated services, school enrollment, infrastructure (e.g., transportation), and community facilities, such as recreation and water systems.

The chapter concludes with a discussion of relevant issues and assumptions, problems and constraints. A summary of the steps involved in demographic analysis accompanies a complete 10-page matrix of tasks, geographic level of analysis, data location, and detailed procedures for each of the characteristics and elements listed above.

3.7 *Environmental Impact* (Volume II, Chapter 5)

The purpose of Chapter 5—the environmental assessment—is to understand the types and extent of OCS-related impacts, and to be able to make comparisons among competing sites. This method uses the results of Chapters 2-4, and provides a major feedback to the Chapter 2—Location Analysis. The techniques described focus on the short-term, direct impacts associated with the construction and operation of OCS facilities. The area of concern is that immediate area directly affected.

WESTON establishes a basic framework for an OCS-related environmental impact assessment report which contains four major steps:

Step 1: Establish the *baseline condition* of the study area.

- Define the study area (with the help of the Chapter 2—Location Analysis)
- Detail the environmental systems of the study area: geology, biology, land use, aesthetics, recreation, air and water quality. A flow chart describes the two-stage information development technique, which concludes with a matrix evaluation and determination of "red flags"

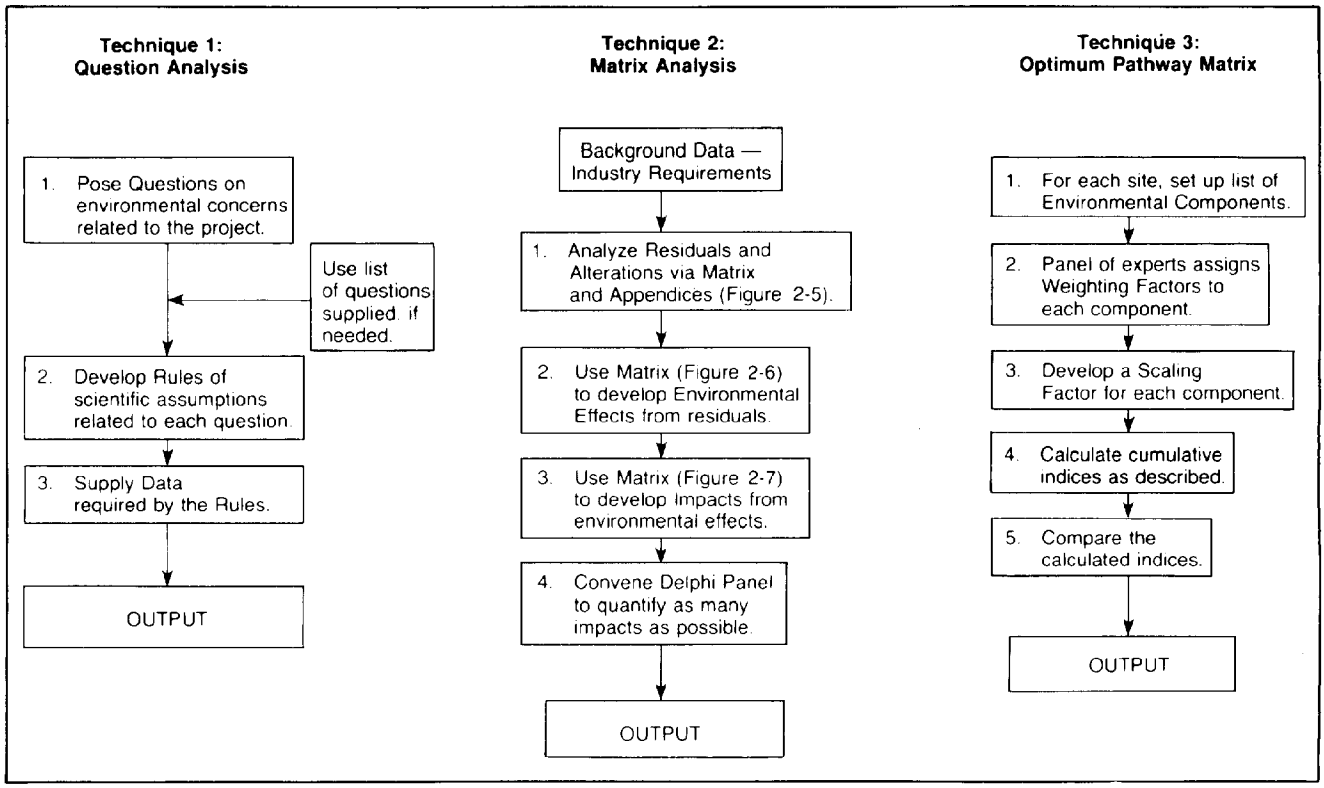
Step 2: Describe expected *future conditions without OCS*-related development

- Estimate rate of population growth, and expected industrial or commercial development (from Chapter 3—Economic Analysis).
- Create five land use suitability map overlays, with possible changes.

Step 3: Develop environmental *impacts with OCS*-development (the major step)

- Establish the OCS-related projects to be located in the study area (from Chapter 2—Location Analysis).

Figure 17: Work Sequence Flow Diagram for Environmental Impact Analysis Techniques [WESTON]



Source: Weston Figure 2-4, Chapter 5—Environmental Impact

Note: The decision categories for choosing between these techniques (as shown in Weston Figure 2-3 are: condition of offshore activity, size of onshore facilities, availability of existing facilities, anticipated impacts, presence of "red flag" impacts, public or private disincentives, public or private incentives, and availability of baseline data.

- Define project activities such as construction dredging (method is obtained from CF's Volume III—*Effects on Living Resources and Habitats*).
- Develop environmental impacts by one of three analytical techniques shown in *Figure 17:* question analysis, matrix analysis, and optimum pathway matrix. A decision diagram is provided for choosing the appropriate technique—generally question analysis is for smaller projects with moderate impacts; the matrix analysis for medium-sized projects with a high probability location, and optimum pathway for the comprehensive computer-based treatment of large-scale projects with significant environmental impacts. Information on the impacts of site alteration and the discharge of residuals is provided by reproducing the Appendices from NERBC's *Factbook*.

Step 4: Analyze *ameliorative actions* which will lessen potential impacts.

- Most of this section is presented as an information source, rather than a technique, covering such actions as project changes, land-use controls, site relocations, and discharge requirements.

WESTON's Environmental Assessment chapter draws heavily from other sources, which are properly identified (with means of obtaining documents listed) or reproduced as appropriate. There are lists of State and Federal environmental resource agencies, and the full list of documents from the *Source Book (See Section 5.6 #1).*

3.8 Fiscal Impact (Volume II, Chapter 6)

The objective of the Fiscal Impact analysis is to estimate the direction and magnitude of the pressure exerted by OCS activity on State and local governments (accumulated to the county level). This analysis is not a prediction of future budgets, because of the discretionary nature of State and local political decisions.

Three methods are presented for projecting governmental revenues and expenditures:

1) *Programmed methodology*—at both the State and county level, total revenues and expenditures are disaggregated, and each category subjected to one of three projection methods: modified trend, expenditure-related or population load. Each of the three is carefully explained, wih precise definitions and sources of information (all data is readily available in published form). A 37-page workbook contains detailed instructions on the 14 input tables, 14 work tables and 5 output tables.
2) Public sector of the *Harris Model*—this can only be used if the Harris Model was used for the Economic Analysis (Chapter 3). The Model simulates the structure of the revenue systems and generates demands for public services. It is the only method which considers political response.
3) *Blend* of State and local forecasts and Option 1—available forecasts could be used to estimate the baseline conditions.

This chapter outlines the advantages and disadvantages of each method, so the analyst can make a choice. Programmed methodology is the preferred method, and may in many cases be the only available option.

3.9 Volume III—Baltimore Canyon Test Case

The WESTON methodologies have been tried out on a test case of the Baltimore Canyon leasing areas, and fully described in Volume III of this series. The chapters of this Test Case volume exactly match those of Volume II: 1—Industrial Requirements, 2—Location Analysis, 3—Economic Analysis, 4—Demographic Impact, 5—Environmental Impact, and 6—Fiscal Impact.

Using the base resource information from USGS and the WESTON method for projecting industrial requirements base information, the expected recovery over a 30-year period amounts to 3.2 billion barrels of oil and 16 trillion feet of cubic gas. This production was then translated into basic employment and facility requirements.

The Location Analysis of Chapter 2, based on calculations by Roy F. Weston, Inc., concluded that, given a significant find in the Baltimore Canyon, a feasible set of locations would be:

- Cape May and Ocean County, New Jersey: service base, marine repair and maintenance, ancillary services, pipeline landfall, gas processing plant, and crude oil processing plant.
- Sussex County, Delaware: service base, marine repair, ancillary services.
- New York Harbor and Raritan Bay, New Jersey: multiple service bases, marine repair and maintenance, ancillary services.
- Out of area of interest: platform fabrication yards, pipe coating yards.

WESTON projects overall impacts do not exceed 2.5 percent of baseline employment or population, and are therefore not significant. However, when the employment impacts are distributed to the three feasible locations, Sussex County, Delaware—currently rural—would appear to have a growth problem.

ACKNOWLEDGEMENTS

Gordon Jacobs served as project officer for the National Science Foundation, Division of Advanced Research and Technology.

The project director for Roy F. Weston, Inc. was Ben Tencer, Ph.D., Vice President for Corporate Planning. The Industrial Requirements chapter was prepared by Frederick R. Harris, Inc., with Joel Goodman as project manager. The Economic Analysis and Fiscal Impacts chapters were prepared by the University of Delaware Center for Policy Studies, while the Environmental Impact chapter was by Peter Klose.

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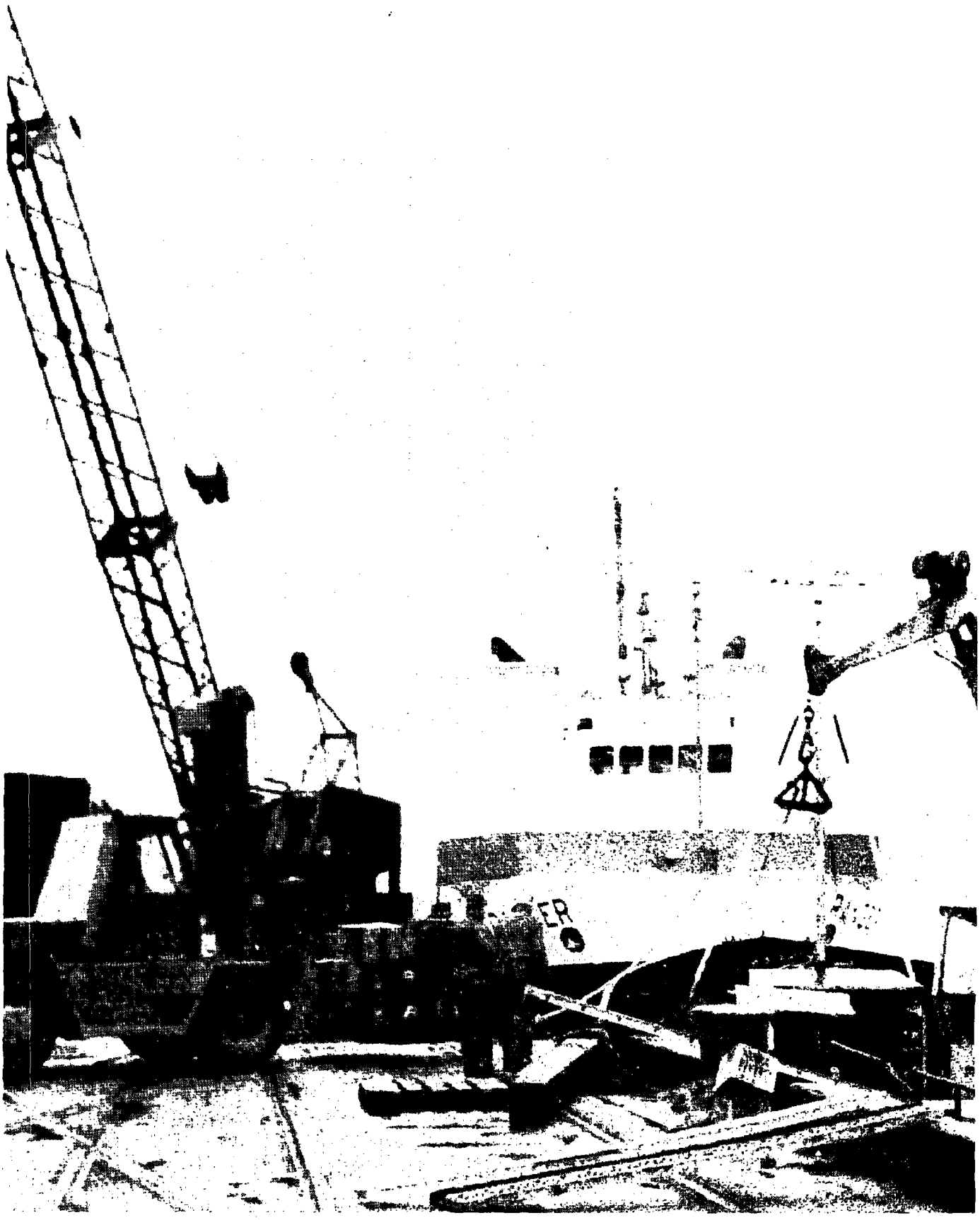


CHAPTER 4: CF—Environmental Planning for Offshore Oil and Gas

Environmental Planning for Offshore Oil and Gas was prepared by The Conservation Foundation (CF) for the Office of Biological Services (OBS)—U.S. Fish and Wildlife Service (FWS), Department of the Interior, for use by FWS field biologists in:

1) commenting on the OCS leasing process—including resource reports for the U.S. Geological Survey (USGS), tract selection—Bureau of Land Management (BLM), lease stipulations—BLM and USGS, exploration plans and development/production plans—USGS; and
2) reviewing specific proposals (permit applications) for onshore facilities, projects and activities—primarily those affecting navigable waters and therefore submitted to the U.S. Army Corps of Engineers (COE).

The major purpose of this study is to describe technological characteristics of facilities and industry planning strategy, and to describe how the effects of OCS development on rural communities and on living resources and habitats can be assessed. It has been assumed in preparing this report series that the FWS field biologist has detailed knowledge of the local environment, but needs an understanding of activities that accompany OCS development. The study's assumptions related to the assessment of impacts are:

1) There is sufficient knowledge of the effects of OCS development activities to anticipate direct and indirect impacts on fish and wildlife from known oil and gas recovery systems.
2) This knowledge can be used to formuate advance criteria for conservation of fish and wildlife in relation to specific OCS development activities.
3) Criteria for the protection of environments affected by OCS-related facilities may be broadly applied to equivalent non-OCS-related facilities in the coastal zone.

The second major purpose of the entire study is to advise State and local planners, Federal agencies, and the OCS development industry of FWS areas of concern in advance of OCS activity or submission of permit applications. This should enable all interests to gauge the impacts of each OCS activity and thus be able to help solve problems associated with protection of public fish and wildlife resources. The CF approach for assessing "effects on living resources" (Volume III) should be especially helpful to State and local biologists.

Organization of the Report

The products of this study consist of five technical volumes under the series title, *Environmental Planning for Offshore Oil and Gas,* presented in nine separate books (Volume V has five books):

Volume I —*Recovery Technology:* introduces the offshore/OCS oil and gas industry; describes 15 specific projects (offshore activities and onshore facilities); explains industry strategies in transportation and siting. [In blue cover; 226 pages]

Volume II —*Effects on Coastal Communities:* describes employment characteristics for projects, and methods for forecasting socio-economic effects on communities with OCS facilities. [Cream cover; 60 pages]

Volume III —*Effects on Living Resources and Habitats:* presents an integrated system of assessing a broad range of impacts resulting from ecological disturbances from OCS-related development. [Red cover; 220 pages]

Volume IV —*Regulatory Framework for Protecting Living Resources:* describes FWS organization and responsibilities, cites laws governing development offshore; describes the framework controlling onshore (and inshore) development directly and indirectly related to OCS activity. [Olive cover; 126 pages]

Volume V —*Regional Status Reports:* reports current and anticipated OCS development in five separate documents, covering:

- Part 1: *New England* [Beige cover; 67 pages]
- Part 2: *Mid and South Atlantic* [Light blue cover; 93 pages]
- Part 3: *Gulf Coast* [Orange cover; 158 pages]
- Part 4: *California* [Green cover; 154 pages]
- Part 5: *Alaska, Washington and Oregon* [Gray cover; 127 pages]

Volumes I, IV and V are helpful and necessary introductions to the OCS development process offshore and onshore, the regulatory framework which controls it, and the status of OCS activity around the nation. Each of these volumes may stand alone; however, Volume I is a necessary reference to Volumes II and III, which provide the methods necessary to evaluate impacts of OCS development. Volume III, especially, assumes the reviewer knows the project descriptions of Volume I.

4.1 *Volume I: Recovery Technology*

The first volume of this study introduces field biologists to a physical description of offshore oil and gas development activities as (1) a direct cause of impacts offshore and (2) a generator of indirect impacts inshore and onshore. Part 1 introduces the offshore oil and gas industry, starting with the demand for energy, petroleum resources (especially on the Outer Continental Shelf), and leading to the current national program to lease OCS tracts for oil and gas development. The final section of this part introduces the six major phases involved in the offshore development process: (1) pre-exploration, (2) geological and geophysical exploration (ending with the lease sale), (3) exploratory drilling, (4) field development, (5) production, and (6) shutdown of facilities. For each phase, the section identifies actions which occur and time constraints on industry.

Part 2 contains detailed descriptions of 15 specific OCS projects listed in *Figure 18* below (these same 15 are used in Volumes II and III).

Figure 18: OCS Activities and Projects [CF]

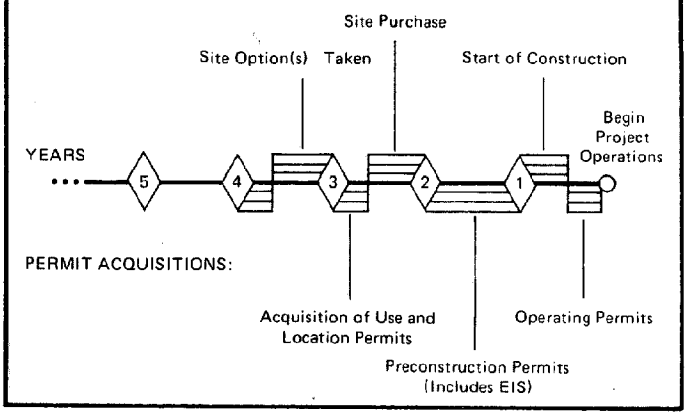
Offshore Development Projects	Onshore Development Projects	Processing Projects
Geophysical survey	Service bases	Refineries
Exploratory drilling	Marine repair and maintenance	Petrochemical industries
Production drilling	General shore support	Gas processing
Pipelines	Platform fabrication yards	Liquified natural gas (LNG) processing plants
Offshore mooring and tanker operations	Pipe coating yards	
	Oil storage terminals	

Following an introduction, each of the 15 project descriptions is divided into eight standard units (Units 5, 6 and 7 are related to Volumes II, III and IV):

Introduction: relates the project to other projects, presents the current national situation, and includes a project implementation schedule (a sample of that schedule is presented below as *Figure 19*) generalized to show minimum, rather than average, times.

1) Description: presents the project—its components, physical attributes and process—in a narrative and graphic format. A significant portion of the descriptions for common projects was drawn from the NERBC *Factbook* to assure consistency of descriptive material.

Figure 19: Sample Project Implementation Schedule [CF] Source: The Conservation Foundation



2) Site requirements: important location considerations are presented, with a distinction between "threshold" and "desirable" factors.
3) Construction/installation: discusses impacts of facility construction on large projects such as platform fabrication yards.
4) Operations: important operational factors, such as industrial process, duration, and characteristics are discussed.
5) Community effects (related to Volume II): addresses induced effects of OCS activity resulting from added employment; estimates of demands for housing, public facilities and public services; and general discussion of the resulting effects on living resources.
6) Effects on living resources (related to Volume III): discusses important environmental strategies related to resource conservation concerns, particularly fish and wildlife and their habitats. As appropriate, discussions are divided into: location, design, construction, and operation/maintenance.
7) Regulatory factors (related to Volume IV): specific discussion of Federal regulations and generic discussion of State and local ones. The strategy of the industry sponsor is discussed in terms of avoidable and unavoidable requirements, and the desire to minimize procedural delays.
8) Development strategy: summarizes the seven other elements of this description, and relates them to major strategic considerations from the perspective of an OCS industry decisionmaker, enabling the reader to understand the relative importance of constraints and trade-offs.

4.2 Volume II: Effects on Coastal Communities

This volume describes a method to predict the secondary growth effects of primary OCS development, and the ecological impacts that may accompany such growth. It contains excerpts from studies used to forecast the characteristics of population growth and community development resulting from industrial development, primarily from OCS activity. Predicting the effects and impacts from OCS development are similar to predicting the effects and impacts from other major industrial development, according to CF. This volume provides a basic understanding of the data needs and sequence of forecasting population and community impacts for persons unfamiliar with the subject. It is not designed to provide the ability to make forecasts with this report alone, although it could possibly be roughly done with the multipliers provided. This volume may also be useful in understanding or reviewing forecasts of community effects made in ES's and other OCS studies.

Written in simple, basic language, this volume is useful for the FWS field biologist and planners/managers who are concerned with the socioeconomic effects of OCS development. Volume II is intended to be used with Volume III to convey the full range of OCS onshore effects.

The volume's four sections present a forecasting process in simplified format so that the key components stand out. Examples from published OCS-related studies are included to illustrate the type of discussion and language the reader will confront in reviewing and evaluating growth forecasts. An extended list of references covers: OCS facilities, lease sales, regional experiences, and socioeconomic effects.

Introduction

The development process is characterized as a network flowing from project to subprojects to activities to disturbances to effects. This network is more fully discussed in Volume III (*See Section 4.3*). The introduction then points out three limitations of the forecasting process: imprecision, selection of boundaries, and feasibility thresholds.

Forecasting Employment and Population

This section describes briefly some commonly used procedures: input/output analysis, the Harris Model used by BLM for Environmental Statements (*described in Section 5.5*), and scenarios. A sample forecast is outlined, working from direct employment through indirect and induced employment to new resident employees, families and total population added. Key elements of the discussion include the multipliers used for induced employment, percentages of resident employment, and family size. The number of direct employees for each of the 15 listed OCS facilities is presented in Appendix A to Volume II.

Community Facilities

This section discusses housing (and residential density), public utilities and services, transportation, schools, recreation, and commercial facilities, identifying accepted planning standards and displaying examples from other studies and areas, especially the Northampton County, Virginia material on the impacts of a proposed platform fabrication yard.

Potentials for Ecological Disturbance

The community facilities of this volume will have their effect through (and can most conveniently be analyzed by breaking them down into) subprojects. The list of subprojects is the same as that used in Volume III (and discussed there in more detail). Those most likely to result from community development are SP-1 through SP-13, and SP-16, as listed later in *Figure 21*.

4.3 Volume III: Effects on Living Resources and Habitats

This volume is the primary working document of the series—a condensed reference source identifying ecological disturbances likely to occur from OCS development onshore—structured to serve as a guide for environmental impact assessment by an FWS field biologist. The CF assessment procedure is best applied to evaluation of a specific proposal, and is therefore generally site specific, not regional in scope. The volume is presented in four parts: Introduction, Impact Assessment, Generation of Disturbances by OCS Projects, and Potential Disturbances of Standard Subprojects.

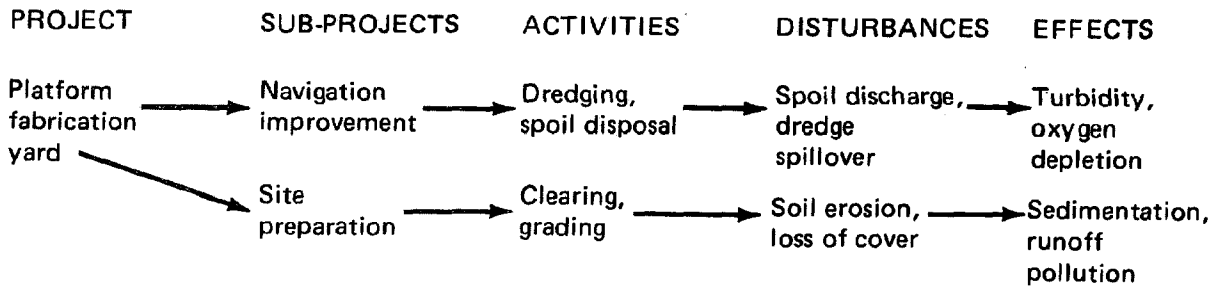
Impact Assessment

The key to impact assessment is a clear definition of the impact cycle and its elements. The standard elements of impact assessments are linked in a chain of causes and effects that starts with human needs, and at the end of the cycle, returns to human needs. The human needs result in *programs* (such as OCS development) which lead to specific *projects* (e.g., a platform fabrication yard). As shown in *Figure 20*, these projects are made up of component *subprojects* which result in *activities*, *disturbances* and *effects*. If these effects degrade the ecosystem, they cause an adverse *impact* (e.g., loss of oysters) that detracts from human needs.

The framework for ecological impact assessment is presented in six sequential steps in Section 2.3 of Volume III:

1) Analyze proposed work plan: identify *subprojects* and *activities*.
2) Select activities with potential for significant disturbance.
3) Analyze potential *disturbance:* describe *effects* (and their sources), and probable *impact* of each disturbance.
4) Identify beneficial modifications to work plan: e.g., design/layout changes, changes in construction/operation, mitigation opportunities, or substitute projects.
5) Make technical recommendation: acceptance, nonacceptance or conditioned acceptance.
6) Make final recommendation after considering reactions to Step 5.

Figure 20: Network of the Development Process [CF]



Source: The Conservation Foundation

Figure 21: Matrix of Subprojects by Project—Impact Assessment [CF]

SUBPROJECTS [Detailed in Part 4 Volume III]		PROJECT GROUPS [Detailed in Part 3] 1. Offshore Recovery and Transmission Systems	2. Offshore Oil and Gas Transmission Systems	3. Onshore Terminals and Transmission Systems	4. Service Bases and Repair Yards	5. Platform Fabrication Yards	6. Pipe Coating Yards	7. Oil Refineries	8. Petrochemical Industries	9. Gas Processing Plants	10. Liquified Natural Gas (LNG) Systems
SP-1	Navigation Improvement			X	X	X	X				
SP-2	Piers			X			X				
SP-3	Bulkheads				X	X	X				
SP-4	Beach Stabilization		[X]	[X]							
SP-5	Site Preparation			X	X	X	X	X	X	X	X
SP-6	Site Development				X	X	X	X	X	X	X
SP-7	Artificial Waterways and Water Bodies					X					
SP-8	Roadways and Bridges				X	X	X	X			
SP-9	Groundwater Supply					X		X	X	X	
SP-10	Sewage Systems										
Sp-11,	Overland Transmission Systems			X							
SP-12	Stormwater Systems			X		X	X	X	X	X	X
SP-13	Solid Waste Disposal			X			X	X	X	X	
SP-14	Industrial Wastewater Systems			X			X	X	X	X	X
SP-15	Industrial Cooling Water Systems							X	X	X	X
SP-16	Pest [Mosquito] Control										
SP-17	Dikes, Levees, and Impoundments							[X]			
SP-18	Offshore Platforms and Structures	X									
SP-19	Marine Transportation Systems		X	X							
SP-20	Submerged Transmission Systems		X								

NOTE: SP-10 and SP-16 apply primarily to OCS-induced community development. [X] means there is no specific subsection, but subproject is mentioned in text.

This framework accepts the premise that the principles and process of environmental assessment are the same whether the issue concerns a permit review, a tract selection, an evaluation of an ES, or an informal appraisal of potential effects.

Generation of Disturbance by OCS Projects

In order to make the environmental assessment, it is essential for the FWS reviewer to identify the *subprojects* within each OCS-related *project*, and then the *disturbances* which are most likely for each type of subproject. In Volume III, CF organizes the 15 projects of Volume I into ten project groups, listed across the top of the matrix in *Figure 21*. The first four groups are combinations of projects, while the remaining six are identical with projects listed in Volume I. Each of the ten group sections in this Part is composed of:

1) a profile subsection,
2) a siting requirements subsection, and
3) a subsection on potential sources of disturbance distinctive to the subprojects within this project group; generic disturbances—covering more than one subproject—are discussed in more detail in Part 4, Volume III.

Figure 21 matches the ten project groups with their component subprojects.

Potential Disturbances of Standard Subprojects

In this Part 4, Volume III, the major construction and operation activities associated with OCS-related projects, and the disturbances that arise from them, are described under the 20 subprojects (SP-1-20) listed in *Figure 21*.

4.4 Volume IV; Regulatory Framework for Protecting Living Resources

Volume IV is a reference document with summarizes Federal regulatory programs affecting OCS oil and gas leases offshore and onshore. It is designed to explain where and how the Fish and Wildlife Service relates to, or affects, OCS rules and procedures, not to be comprehensive about OCS development regulations. There is only generic reference to State and local roles in development permitting.

Volume IV is presented in three parts, as follows, and is intended to be read as an overview, with references and appendices to provide more detailed information. The following material, then, is presented as an expanded outline of the volume.

Fish and Wildlife Service

This part presents the organization and objectives of the Fish and Wildlife Service, FWS service programs, offshore oil and gas related programs, the Division of Ecological Services (ES), and the Office of Biological Services [which sponsored this assessment method]. Excellent figures illustrate the role of FWS in reviewing OCS-related development projects under the Fish and Wildlife Coordination Act of 1958, especially FWS responses to construction activities requiring Corps of Engineers (COE) permits; participation in National Environmental Policy Act (NEPA) reviews; and coordination with other Department of the Interior agencies under Secretarial Order 2974.

Outer Continental Shelf Oil and Gas

This section provides a concise description of the OCS process as defined under the Outer Continental Shelf Lands Act of 1953, BLM and USGS regulations, and Secretarial Order 2974; covering Federal program responsibilities, lease tract selection, environmental impact statement, departmental decision process, lease sales, post sale management, and environmental studies. This section was prepared before the 1978 Amendments to the OCSLA and the OCS regulations of the Secretary of the Interior, which are discussed in *Chapter 6* below.

Onshore and Nearshore Development Management

This final section considers Federal, State and local roles in nearshore/onshore OCS development permitting, and access to decisions through the NEPA process. Place related Federal management programs discussed include COE permits for dredged materials, permits and licenses for use of Federal land, marine and estuarine sanctuaries, coastal zone management, Section 208 water quality management planning, and endangered species protection. Federal permits are issued for oil and gas pipelines, deepwater ports, tanker operations, and the National Pollutant Discharge Elimination System (NPDES).

4.5 Volume V: Regional Status Reports

In five separate documents, Volume V presents regional reviews for: (1) New England, (2) Mid- and South Atlantic, (3) Gulf Coast, (4) California, and (5) Alaska, Washington and Oregon. The regional reports focus on past and potential impacts of OCS activities, on living resources and their habitats, and are meant to inform FWS staff and other interested persons outside the region.

The five reports were prepared by analysts selected by The Conservation Foundation for their recognized expertise in OCS impacts or coastal zone management for their region. The format and organization of the reports is consistent, following the five sections outlined below. Variations in report contents reflect regional differences in geography, lease sale timing, OCS experience, and the author's approach.

1) The initial section of each report is a discussion of past and present *OCS production* (where applicable). This provides a historic perspective for the remaining sections, with statistics on lease sales, production and reserves.
2) The second section describes *OCS development and future potential*, including industry schedule and anticipated future projects. This section varies depending upon the amount of anticipatory investigation completed by public agencies and industry.
3) The third section discusses the *effects on living resources* of activities that accompany OCS petroleum development. A majority of these con-

cerns occur nearshore or onshore, where resource values and high impact potential are concentrated. The relative importance of particular habitats and living resources vary by region.

4) The fourth section concerns *socioeconomic impacts*. These issues are generally treated in less detail, because living resources is the primary subject of the project, and the socioeconomic impact information is only to provide a background. Two major topics are included in each report: effects of anticipated development, and regional interest in OCS development.
5) The fifth section is *regional information analysis*. Publications of regional import are annotated. Each study lists about a dozen publications which contain the best regional research into OCS development and related issues.

These sections are related to other volumes of the study as follows:

Section 1: past and present OCS production	Volume I, Part 1
Section 2: OCS development and future potential	Volume I, Part 1
Section 3: effects on living resources	Volume III
Section 4: Socioeconomic impacts	Volume II
Section 5: regional information analysis	Not comparable

Each regional report is meant to provide a compilation of information available for the region through mid-year 1976. The material is time-sensitive, and may therefore have limited value, especially in Sections 1 and 2, because of changes in the OCS situation. However, since each area is at a different stage of development, the more advanced areas may have useful experience for the regions of later sales.

Part 1: New England

This report concentrates on the projected impacts of development of Georges Bank and the concerns of interest groups and public officials. The appendix includes (1) State concerns and OCS planning efforts, and (2) regional OCS planning efforts. (Prepared by Virginia Tippie, Ph.D. and Don Robadue)

Part 2: Mid-and South Atlantic

This report concentrates on the Baltimore Canyon Trough lease area, with primary effects on the coasts of New Jersey and Delaware. The South Atlantic concerns are with the Southeast Georgia Embayment and the Blake Plateau. (Prepared by Joel Goodman and Peter Klose)

Part 3: Gulf Coast

This especially good report covers historic and present offshore oil and gas production, and onshore impacts on living resources, for the region with the most offshore experience. (Prepared by Anthony J. Mumphry, Ph.D. and Gino Carlucci)

Part 4: California

This report concentrates on historic and future activity in Southern California, with appendices on (1) existing petroleum-related facilities, (2) oil and gas related facilities on the Southern California coast, (3) oil and gas sanctuaries, (4) fish and shellfish, (5) scientific or conservation organizations, and (6) oil spill trajectory maps. (Prepared by Ruthann Corwin and Patrick H. Heffernan)

Part 5: Alaska, Washington and Oregon

This is an especially detailed report on the region (almost exclusively Alaska) with the greatest number of projected OCS lease sales. In Part 2, the report presents: description of the area, petroleum resources, status of OCS operations, and environmental and socioeconomic impacts for nine individual regions: Northern Gulf of Alaska, Lower Cook Inlet, Western Gulf of Alaska, Beaufort Sea, Chukchi Sea (Hope Basin), Bering Sea (St. George Basin), Bering Sea (Norton Basin), Southern Aleutian Shelf, and Bristol Bay. Appendices are provided on OCS issues in Alaska, Alaska's response to OCS development, and endangered species in all three states. (Prepared by Marc J. Hershman and James H. Feldman)

NOTE: The U.S. Fish and Wildlife Service continues to develop more specific user reports based on *Environmental Planning for Offshore Oil and Gas. See Section 5.6 #8* for a recent example, *Managing Oil and Gas Activities in Coastal Environments.*

ACKNOWLEDGEMENTS

The U.S. Fish and Wildlife Service Project Officer, with a substantial role in writing the report, was Larry Shanks of the National Coastal Ecosystems Team (NCET).

John Clark served as Project Director for The Conservation Foundation. In *Environmental Planning for Offshore Oil and Gas*, Volume I is by Clark, Jeffrey Zinn and Charles Terrell; Volume II is by Jeffrey Zinn. John Clark and Charles Terrell wrote Volume III; and John Banta wrote Volume IV. The authors of parts of Volume V were noted above.

Further information may be obtained from:

Larry Shanks, Project Officer
National Coastal Ecosystems Team
Office of Biological Services, FWS
National Space Technology Laboratories
NSTL Station, Mississippi 39529
(601) 688-2091 FTS 8-494-2091

OR

John Clark or John Banta
Coastal Resources Project
The Conservation Foundation
1717 Massachusetts Avenue, N.W.
Washington, DC 20036
(202) 797-4360

CHAPTER 5: Other Relevant Planning and Impact Methods

Individual States and other Federal agencies have developed planning and impact methods more limited in scale and scope than the three prime methods presented in *Chapters 2, 3 and 4.* This *chapter* is designed to present a select number of these other relevant methods which may be useful to OCS planners. Finding appropriate methods proved to be a difficult task—few other methods or planning/impact studies adequately document their techniques or are applicable to other jurisdictions.

PART ONE

The two major studies described in this part meet the criteria of:

1) developed by a State government (no local government has developed one);
2) related directly to OCS oil and gas development;
3) relatively comprehensive in scope and scale;
4) one covering frontier and one covering experienced areas;
5) completed within the past year;
6) applicable to other States; and
7) readily available.

Maryland's *Major Facilities Study* presents a systematic process of regional screening for suitable areas and sites, conflict resolution, and the assessment of economic, fiscal, social, and environmental impacts of specific facilities. It also considers facilities other than OCS-related (e.g., power plants). Texas' *Offshore Oil—Its Impact on Texas Communities* develops scenarios of offshore and onshore activity, and projects their general impact on regions of the Texas coast and the State as a whole.

5.1 *Maryland Major Facilities Study*

Maryland is not expected to be heavily impacted by OCS development, but is concerned abou OCS, energy and industrial facilities locating on its portion of the Chesapeake Bay and Atlantic coasts. This study covers all these potential major facilities, concentrating on *siting and location analysis* based on the suitability of areas and the needs of 15 major facilities. *Impact assessment* methods are presented in two understandable and easy to use handbooks. The entire study is logical, well-written—with excellent graphics—and tested in a specific case. The assessment technique should be easily transferable to other states. The study is presented in five volumes:

Executive Summary	January 1978, 84 pp.
1 - Regional Screening and Conflict Resolution	January 1978, 300 pp.
2 - Eastern Shore Power Plant Siting Study	October 1977, 257 pp.
3 - Economic, Fiscal, and Social Assessment Handbook	December 1977, 286 pp.
4 - Environmental Assessment Handbook	December 1977, 280 pp.

Source; Energy and Coastal Zone Administration, Maryland Department of Natural Resources; project coordinators were Dr. Paul Massicot, Howard Mueller, and Louis Hecht, Jr. The report was prepared by: Rogers & Golden, Inc. (Philadelphia) and Alan Mallach Associates (Trenton). The study director was John Rogers.

Obtain Copies from: ECZA, Tawes State Office Building, Annapolis, Maryland 21401. Printed copies of the *Executive Summary* are being distributed nationally, and are available free-of-charge. Complete sets are available in microfiche. Printed copies of the set are not available. For more information: Call Scott Brumburgh, Maryland ECZA, (301) 269-2261.

Audience: The study covers 16 coastal counties (and Baltimore City) of Maryland, and is primarily intended for use by coastal county officials. It is also used by State planners for project evaluation, CEIP funding proposals, and identification of sites for energy facilities (to be acquired by the State under its unique Power Plant Siting Program).

Facilities Covered: The nine OCS-related facilities in the study are: (1) operations [service] bases, (2) platform fabrication yards, (3) pipeline landfalls, (4) pipe-fed and (5) tanker-fed intermediate production terminals, (6) natural gas processing plants, (7) oil storage facilities, (8) oil refineries, and (9) LNG receiving terminals and storage facilities. The six non-OCS facilities covered are: (10) nuclear power plants, (11) fossil fuel power plants, (12) industrial parks, (13) sand and gravel facilities, (14) ports, and (15) shoreline residential and marina developments.

Use of the Volumes: The *Executive Summary* should be obtained and reviewed before deciding to use the entire study. It is especially useful in showing the products of the regional screening process. Volume 1 is an independent part of the study, and may be used during the planning and leasing phases, prior to specific proposals, to identify and rank candidate areas for onshore facilities. Volumes 3 and 4 are companion volumes designed to aid in identifying and analyzing potential effects of specific proposals for major facility development. They may be used independently of other volumes. Volume 2 presents the results of a case study which used the regional screening process and impact assessment procedures of the other volumes.

Volume 1 - Regional Screening and Conflict Resolution

"Determining coastal locations most likely to contain areas suitable for the development of specified major developments," is achieved through the regional screening process, the application of a series of locational and functional criteria to regional physical, economic, social and environmental data. Three categories of criteria are defined and described:

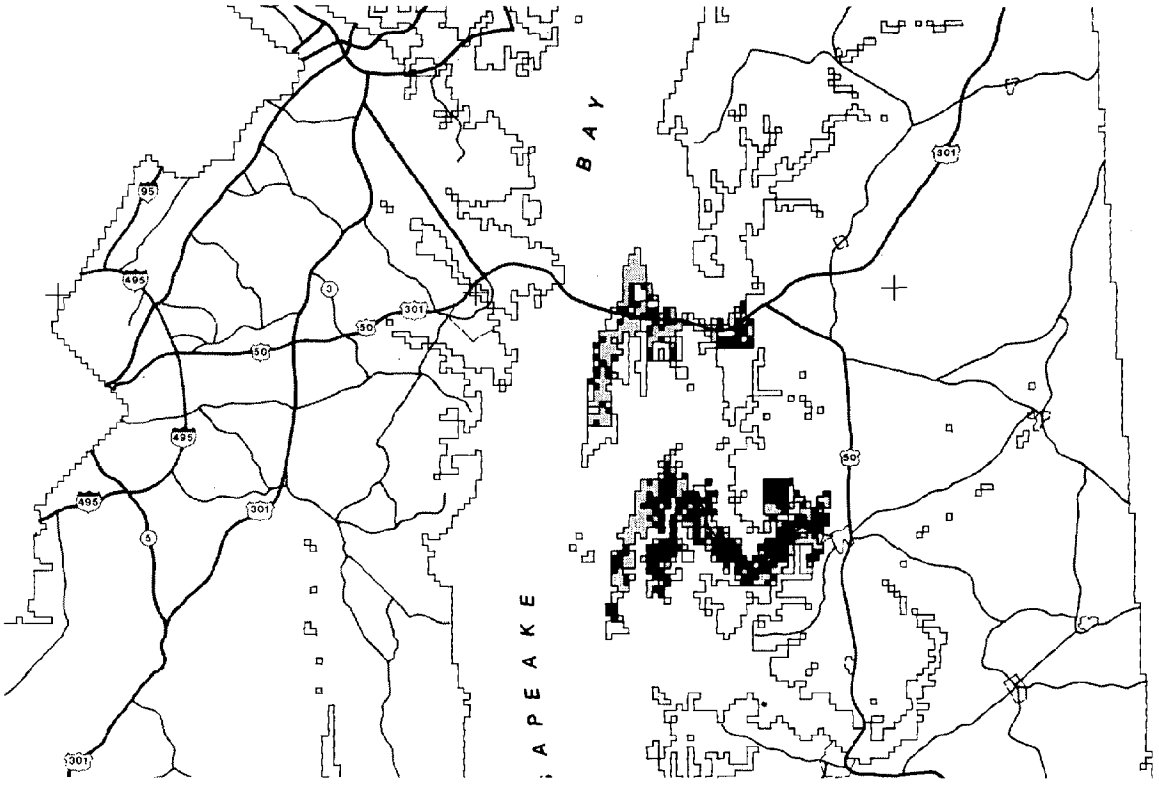
1) *Facility-related* criteria deal with both [1a] threshold (minimum needs) and [1b] optimal conditions under which development might proceed.
2) *Exclusion* criteria operate as a threshold at the regional level, and are applied in the initial phase to exclude specific land areas, e.g. Federally owned lands, from further consideration.
3) *Potential restriction* (or "public concern") criteria—applied only to candidate areas which pass the thresholds—call for the conscious avoidance of areas having characteristics such as "protected resources."

The major components of the regional screening process are to:

1) Identify threshold areas by eliminating areas that are clearly not suitable for facility development (using criteria 1a and 2);
2) Identify and describe candidate areas (using criteria 1b and 3); and
3) Determine the most suitable candidate areas.

This process is applied individually to each of the 15 potential OCS-related or non-OCS major facilities. The results in Maryland's coastal zone were the identification of suitable sites for each of the 15 facilities (ranging from one for oil refineries to 136 for oil storage facilities). The individual results are portrayed on maps such as that shown in *Figure 22*, which shows oil storage faciltiies.

Figure 22: Sample of Maryland Regional Screening Process—Oil Storage Facilities



Source: *Maryland Major Facilities Study.*

A major strength of the Maryland regional screening process is that it is open and invites scrutiny. It allows anyone to review how the results were achieved, and to reapply the method if different criteria are chosen or new data becomes available. Another strength is that the process reserves the introduction of subjective values until the last set of steps, when areas have been fully characterized by objective data. In Maryland, this allowed the State to identify suitable candidate areas outside potentially restricted areas, thus avoiding the need for a decision on maintaining restrictions.

The screening process could be geographically based because data was mapped on a uniform regional scale, the Maryland Automated Geographic Information (MAGI) System scale. Collecting and integrating tremendous amounts of data can present serious problems, which are thoughtfully discussed in Appendix A—Data Scaling and Weighting, of Volume 1.

Conflict Resolution addresses the second goal of the study: "to develop a method for identifying and evaluating conflicts involved in the siting of major facilities." The three major sources of potential conflict are the facility, the site, and public policy. Potential conflicts may be grouped in four ways: (1) Facility—Site; (2) Facility—Facility; (3) Facility—Policy; and (4) Policy—Policy. Volume 1 defines each of the potential conflicts, makes five major assumptions and outlines conflict resolution procedures. For example, the regional screening process may designate the same area as "most suitable" for more than one kind of facility. These "Facility — Facility" conflicts are shown on a coast wide map. A straightforward eleven-step process is presented for resolution of these conflicts. The study concludes, however, that significant conflicts are unlikely to occur.

Volume 3 - Economic, Fiscal, and Social Assessment Handbook

This handbook is designed principally for analyzing the effects triggered by a specific major facility proposal. A county (or State or local) planner can determine, on a year-by-year basis, the additional employment, income, population, tax revenues, housing demands, and government service and expenditure requirements that would take place in the county.

The *Handbook* is presented in three parts. Part One contains five chapters covering economic effects, population and housing, and, flowing out of these, fiscal effects:

1) Economic—county employment and income, using a variation of the classical multipliers;
2) Population and Housing—considers movement of workers into the county, allocation among 2 to 4 subareas in the county (using a modified gravity model), the conversion of employment into households and school children, and projection of housing demand;
3) Revenues—significant state and county revenues;
4) Service demands—police, fire, sewer, water, solid waste disposal, health, education—considers effects of policy choices; and
5) Costs—using per capita costs and present trends.

For each of these chapters, there is a discussion of the overall structure and content, materials needed to run the model, and—for each operation— a narrative description, reference or input tables, and blank forms to be used. Sixty forms are provided for the five economic and fiscal chapters.

Part Two presents a single chapter on the "assessment of social effects." The chapter is concerned primarily with the non-quantifiable effects of a largescale facility moving into a non-metropolitan area. Part Three provides four chapters of background and reference materials for use in the assessment process. For example, Chapter 9 presents labor force requirements of major facilities, including the nine OCS-facilities listed above.

The economic section requires the greatest expenditure of time. The number of steps is large, but it does not require great mathematical sophistication—it does require care in performing the calculations. The entire assessment can be done manually; however, the entire process is being computerized in Maryland and will be operational early in 1979. A *User's Manual* will be produced as a technical guide to the computer program.

Volume 4 - Environmental Assessment Handbook

This handbook was designed as a reference and guide for participants (especially county planners) in the review and approval of major facilities. It provides detailed methods of measuring the effects of facility development, and suggests a way in which results of various assessments may be compared. Its users do not need extensive previous experience with environmental assessment techniques.

Designed to facilitate an orderly assessment procedure, the *Handbook* is organized into four parts. Part One presents a summary of the assessment process and a discussion of the important aspects of environmental assessment.

Part Two identifies development effects resulting from a variety (45) of activities carried out during (1) land-based site preparation, (2) land-based facility construction, (3) water-based site preparation and construction, and (4) operation and maintenance. A matrix for each of the 15 facilities shows the necessary activities and the specific environmental factors which they affect. *Figure 23* shows a corner of the matrix for oil refineries.

The twenty-six possible environmental factors across the top of the matrix are each addressed in a separate chapter in Part Three. The assessment process for each is described, covering the effects to be measured, measurement units, measurement technique, assessment responsibility, and sources of technical assistance. When several methods of assessment related to a particular resource or hazard are available, the report indicates those methods used by State and Federal agencies, and the limitations of each method.

Figure 23: Sample Facility Matrix—Oil Refineries [Maryland] Source: Maryland Major Facilities Study.

OIL REFINERIES	Mineral Resources	Soil Loss	Shoreline Erosion	Subsidence and Landslides	Productive Agricultural Land	Stormwater Runoff	Flood Hazard Areas	Wetlands	Surface Water Quality	Groundwater Quality	Groundwater Quantity	Vegetation Hazards	Rare, Endangered, and Endemic Plants	Upland Forested Areas	Finfish and Shellfish	Waterfowl	Predatory Birds	Upland Wildlife	Endangered Wildlife	Air Quality	Odors	Noise	Sites of Historic Importance	Archeological Resources	Visual Quality	Outstanding Natural Features
LAND-BASED SITE PREPARATION																										
Existing structure removal and disposal	X						X						X	X	X	X	X	X	X	X			X	X	X	X
Subsurface exploration	X	X		X						X	X	X		X				X	X					X		
Topsoil removal and stockpiling	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	X			X	X	X	
Vegetation removal and disposal	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X
Surface grading	X	X	X	X	X	X	X		X		X	X		X	X		X	X	X	X			X	X	X	
Bedrock blasting	X			X					X	X	X	X		X		X	X	X	X	X		X	X	X	X	X
Drainage				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							X
Dewatering				X	X	X	X			X	X	X	X	X	X	X	X	X	X							
Filling	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X			X	X	X	X
Equipment operation		X	X	X	X				X			X	X	X		X	X	X	X	X		X	X		X	
LAND-BASED CONSTRUCTION																										
Excavation and shoring		X							X						X										X	
Cement mixing and processing									X			X		X			X	X	X	X						

Two other important contributions are made in Part Three: a discussion of particular maps and other tools that are vital to environmental assessment, and a glossary which defines a wide variety of terms used in all types of assessments.

Part Four of the *Environmental Assessment Handbook* covers the final stage of environmental assessment: evaluation. The project evaluation work-sheet presented there (the headings are shown in *Figure 24)* offers a means of comparing the rsults of environmental factor assessments and arraying all of them in a comprehensive format. The Worksheet is designed to aid in the decision-making process which follows assessment.

The factors along the left axis are the 26 listed above. The Maryland process involves assigning values of from 1 to 5 on both "degree of effort" and "degree of importance," but unlike NERBC method (Methodology 3, Work Element 10), its authors refuse to multiply the two values to get an "impact." The Study concludes that environmental assessment is still highly judgmental.

Volume 2 - Eastern Shore Power Plant Siting Study

This volume, actually the first published (in September 1977), applies the regional screening method described in Volume 1 to Maryland's Eastern Shore in order to locate possible sites for three types of electricity-producing facilities: 2400 MWe nuclear power plant, 1200 MWe coal-fired fossil fuel plant with barge fuel delivery, and 1200 MWe coal-fired fossil fuel plant with rail delivery. Criteria for each type of plant were determined and applied to the regional data covering eight counties for exclusion, potential restriction, and socioeconomic criteria. For both nuclear and fossil fuel plants, few thresholds eliminated areas from further consideration. At the end of the regional screening, 66 sites remained (including 10 suitable for any type of power plant).

This set of 66 separate areas was systematically narrowed to four sites, which were examined in detail for their suitability for power plants. The methods set out in Volume 3 - *Economic, Fiscal, and Social Assessment Handbook* and Volume 4 - *Environmental Assessment Handbook* were

Figure 24: Sample Project Evaluation Work Sheet [Maryland] Source: Maryland Major Facilities Study.

Level of Effect	Nature of Effect (+) (-)	Duration of Primary Effect		Mitigation	Degree of Effect	Degree of Importance	Comments
		T/P	Actual				

used for this detailed analysis. For the most part, existing site-related data was used (the only exceptions being core samples and aerial photography). The primary attention was given to physical environmental effects.

While this case study does not cover OCS-related facilities, it shows that the Maryland process can be applied to identify suitable sites and to assess the impacts of specific facility proposals on those sites.

Cost Estimates

Potential costs of developing a major facilities study for a State is based on the experience of the State of Maryland, which required approximately $400,000 as follows:

- candidate area regional screening process for an entire State (size of the State is generally not a factor—one third to one half the cost is devoted to developing tailored criteria, with the remainder for conflict resolution and the screening itself) — $200,000
- determining specific sites and conducting preliminary site analysis (using existing information) — 100,000
- developing an economic, fiscal, and social assessment handbook — 60,000
- developing an environmental assessment handbook — 40,000

The first and second items assume the availability of a computer-based geographical information system, such as Maryland's MAGI (Maryland Automated Geographic Information). Without such a system, the time/cost requirements would increase substantially depending on the size of the State.

The format and methodology of the two handbooks could easily be applied to any other State, but the assumptions and values presented here apply specifically to the coastal counties of Maryland. Another State would have to modify the Maryland format and collect pertinent data, which might cost approximately one-half to two-thirds of that incurred by Maryland.

Using the handbooks is quite inexpensive, once they are developed. Maryland estimates the cost of using the Economic, Fiscal and Social Handbook for a specific site at $1,000 to $2,000. Applying the Environmental Handbook to a specific site varies in cost, depending on the size and complexity of the project, the existing environment, and availability of information.

5.2 Offshore Oil: Its Impact on Texas Communities

Texas is a State experienced in the onshore impacts of offshore oil and gas development. Much of the necessary onshore infrastructure for the petroleum industry is already in place; the effects of new offshore production will be quite different from those in a frontier State such as Maryland. There are, however, areas of the long Texas coastline which may be affected for the first time with additional OCS activity. The Texas approach is to develop scenarios for offshore activity in three different OCS locations—and then project the impacts which may occur under each scenario.

The report is presented in four volumes, printed in three documents, all dated June 1977:

Volume I - *Executive Summary* (60 pages)
Volume II - *Local Impact Scenarios* (599 pages)
Volume III - *Aggregate State Impacts* (45 pages) and
Volume IV - *Appendices* (236 pages)

Source: Texas Coastal Management Program, General Land Office of Texas, 1700 North Congress Street, Austin, Texas 78711. The report was prepared by: Research and Planning Consultants, Inc., Austin, Texas (firm which served as the States's prime contractor for development of the Texas Management Program); the project manager was Frank Sturzl.

For more information, call: Ron Jones, Research and Planning Consultants, Inc., (512) 475-6902.

Audience: Professional State and regional planners; public and private decision-makers in Texas. For them, the study:

1) Presents a tested methodology for estimating the impacts of future OCS development on Texas cities and counties;
2) Provides OCS development scenarios to acquaint public and private decision-makers with the potential onshore impacts of OCS activities on their areas of responsibility; and
3) Provides an analysis of current Federal programs which could compensate State and local governments for the fiscal deficits OCS developments will cause in Texas.

In general, the policy objectives were to develop a methodology which would isolate potentially significant issues for affected jurisdictions and analyze those issues in terms of timing and magnitude.

Facilities: At the regional (multi-county) level, the report considers service bases, and a variety of supporting, ancillary activities. For the State as a whole, the report projects aggregate State impacts on refining, gas processing, drilling rig construction, platform construction, petrochemical plants, and storage facilities.

Use of the Volumes: The Texas planning methodology is one of the most complete of those identified in this chapter. It would, therefore, be useful for prospective users to review the *Executive Summary* before plunging into the entire report. The volumes lead logically from an introduction through local impacts to State impacts. The final volume presents background information and methodologies necessary to develop scenarios and make impact projections. The volumes do not, therefore, stand alone, but comprise an integrated package which must be used in concert.

Volume I - Executive Summary

This short and clear document presents the introductory and summary sections of the report, as well as a chapter on the legislative precedents for Federal mitigative assistance to State and local governments, especially the Coastal Energy Impact Program (CEIP).

Volume II - Local Impact Scenarios

Each of the three local impact scenarios in this volume is based on a specific "strike area"—differing geographically rather than differing in levels of activity. Each covers a sequence extending through pre-lease sale exploration, the sale itself, exploratory drilling, development, and production, Each scenario describes offshore events and the amounts of oil and/or gas produced. The resultant activities, requirements, effects, and impacts are then traced to the seven onshore regions. Each scenario strike area represented contains a broad range of types and amounts of equipment required for exploration, development, and production; time periods of development; and amounts and types of production.

The Impact Methodology is actually seven separate methodologies which were applied to each of the three location scenarios. The methodologies are further divided into serialized tasks, for example, Methodology A, Task A1, Task A2. The listing of tasks below indicates not only the work to be done, but also the products of individual tasks and methodologies. The methodology is intended to be used straight through, from A to G, with no methodology omitted or substituted. The methodology is fully described in Appendix A, Volume IV. The seven methodologies are:

Methodology A — Scenario Description

Interpret existing data (probably from USGS) relating to potential OCS reserves; describe postulated strikes; analyze industry practices (described in Appendix D); and prepare scenario descriptions.

Methodology B — Exploration Methodology

Methodology C — Development Methodology

Methodology D — Production Methodology

All three of these methodologies have the same tasks: Describe the sub-scenarios and distribute onshore requirements to coastal study sites (the seven regions); then, for each study site/region, identify primary land, water, and manpower requirements, and indirect land needs; project expenditures by Standard Industrial Code (SIC) and primary tax revenues; use the Outer Continental Shelf Oil and Gas (OCSOG) Input/Output Model (modified from the Texas Input/Output Model) to determine indirect tax revenues, personal income generated, indirect employment and water requirements, and total tax revenues over time.

Methodology E — Net Onshore Impacts

Aggregate state tax revenues, primary and indirect employment, primary and indirect water and land requirements, and study site tax revenues—for all phases in each affected study site (employment is divided into commuter, resident and new resident shares); identify significant infrastructure issues and project costs (for administrative/financial capabilities, housing, water, sewage collection, solid waste, police, fire, recreation, health and education; and project net fiscal impacts on State and local governments.[5]

Methodology F — Environmental Impact Methodology

Use an environmental impact matrix[6] to identify likely sub-State regional effects of OCS development; describe and evaluate general environmental impacts (especially land, water, and waste residuals); describe special issues and analyze impacts; and prepare an environmental assessment.

Methodology G — Social Impact Assessment Methodology

Identify social effects using a social impact matrix. Describe general social effects in a general social impact evaluation (factors covered are: demographic, services to people, land use and environmental, housing, employment, and traditional values); describe the social aspects of each identified special issue in a detailed analysis; and prepare a social assessment for each OCS scenario.

Volume III - Aggregate State Impacts

Up to this point, there have been several economic sectors not considered, and the local scenarios encompass only one defined geographical area. There are some impacts which are evident, however, only when one studies the aggregation of all oil and gas activities in Texas OCS. These impacts include the increase of capacity for the refining industry (Chapter 2) and gas processing (3); exploratory drilling rig construction (4), platform fabrication (5), petrochemical plants (6), and storage facilities (7). The estimates are heavily influenced by a consideration of existing facilities and capacity (inventoried in Appendix H).

Volume IV - Appendices

The nine appendices include the "Study Methodology," Appendix A (45 pages); and the Outer Continental Shelf Oil and Gas (OCSOG) Input/Output Model, Appendix E (25 pages). This model was developed by the Office of the Governor in 1973, and since updated.

In essence, an input/output (I/O) model is an accounting system which traces the flow of goods and services throughout an economy. The OCSOG Model is based on the original Texas I/O Model, but is made up of seven sub-regional models. OCSOG is used to calculate the direct effects of oil and gas development, that is, the direct employment, land, and water requirements. The tools developed in the model are multipliers which are used to estimate changes in the level of income, employment, taxes, or natural resources based on a changing economy. Multipliers of this type were developed in each of the regional OCS input-output models. In general, tax multipliers can be of assistance to public and private officials in measuring the

impact on public services as a result of a given change in the economy.

Bibliography (Appendix J - 47 pages) This methodology has the most complete bibliography of any report described in this *Guide*. The Bibliography is divided into two groups:

Group 1 - contains entries for impact studies, environmental, economic, demographic, social, or infrastructural. This also has a section of annotated entries for significant documents and secondary sources.

Group 2 - consists of entries for documents considered to be inventories or descriptions of baseline data on the environmental, economic, demographic, social or infrastructural characteristics of the Texas Gulf Coast.

"Survey of Selected Modeling Techniques"(Appendix G—19 pages) is available separately and is described in the *Annotated Bibliography (See Section 5.6 #5).*

PART TWO

The three planning methods presented in this part are not as comprehensive as the three prime ones of *Chapters 2, 3,* and *4,* nor the two described above in *Part One.* They may, however, be quite useful as supplements to other methodologies or to address specific problems.

5.3 *A Process for Coastal Resource Management and Impact Assessment* [Louisiana]

This is probably the most readable OCS assessment report available, with extensive use of clear and stimulating graphics. It stresses the management of coastal environmental resources, and how to assess the environmental impacts of OCS development. The process is easily adaptable to any other State or local area.

Source: Louisiana State Planning Office, prepared by Coastal Environments, Inc. (Baton Rouge), August 1976. Sherwood M. Gagliano was the project director.

Obtain from: National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161. NTIS No. PB-264811/AS.

Audience: Elected and appointed officials, citizens and private sector interests not professionally involved in planning; professional State, regional and local planners. For them, the report is designed to, among other goals:

- present a practical procedure for developing a coastal resource management program,
- present a systematic approach to resource management, and
- present an approach to assessment of onshore impacts resulting from OCS-related resource development.

The primary elements of the report are "The Process of Management" and the process' final step, "Reviewing Proposals and Assessing Impacts."

The Process Of Management

Following an introduction to the coastal setting, the report deals with the essential programs and processes of environmental management. The tasks of three important phases, along with a program schedule, are presented for the process of becoming operational.

Under "collecting and interpreting data," the report presents a one-page concise discussion and a facing page of an illustrative map, for natural and cultural parameters of:

- hydrologic features, and hydrologic resources
- geologic features, and geologic resources
- botanical features, and botanical resources
- wildlife features, and wildlife resources
- climate
- land use and economy
- cultural history
- circulation
- landscape imagery

This section concludes with defining, developing, and implementing goals.

Reviewing Proposals and Assessing Impacts

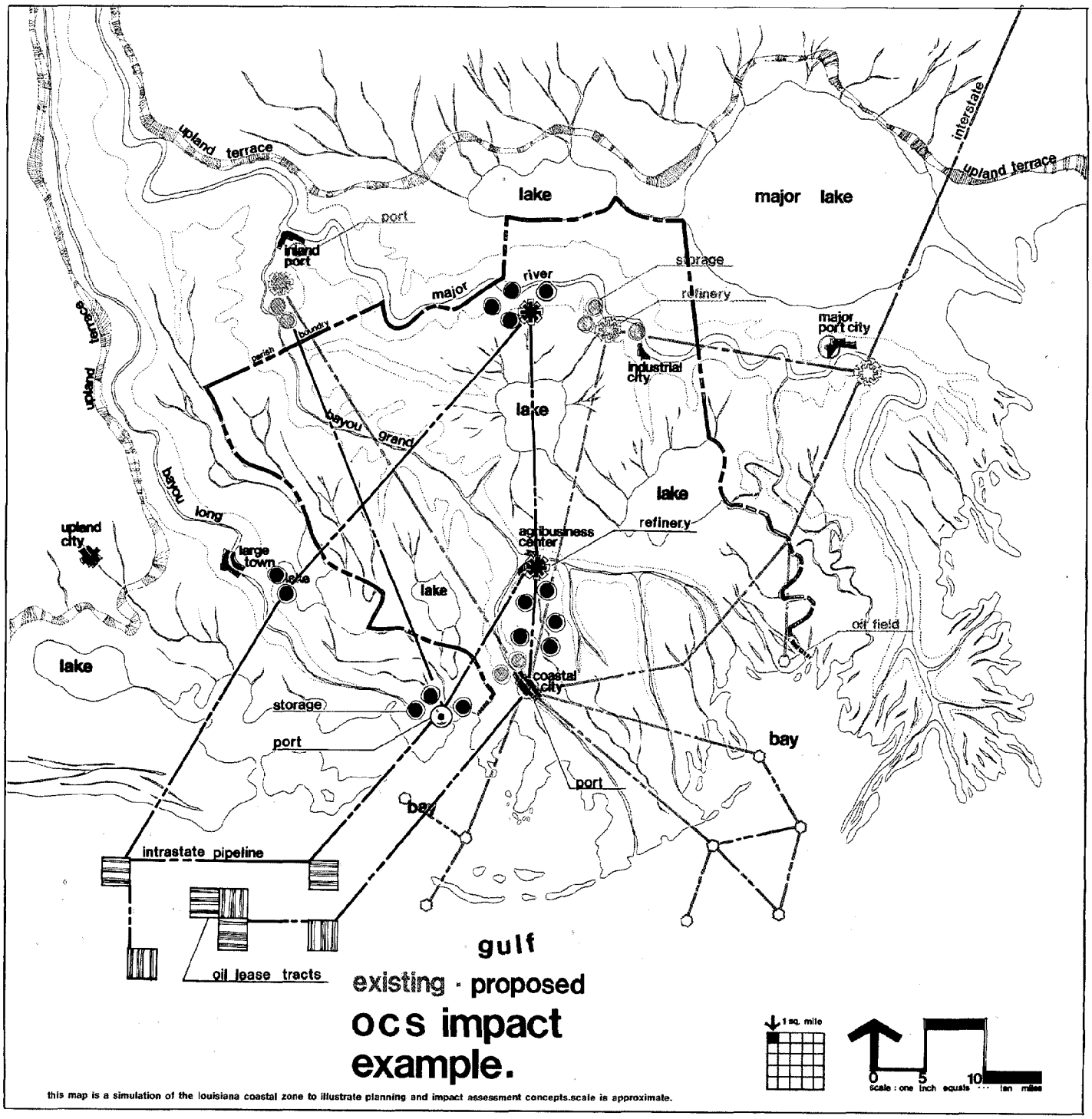
This section begins with concise statements on understanding environmental impacts, impact assessment and the management process, types of impact, and the impact assessment process. The process is illustrated by "the OCS example," with a three-year schedule outlined for dealing with local energy-related developments. Investigation of proposed actions and alternatives discusses the phases of OCS development, variables such as size of the field, and assumptions of the planning model. Existing and proposed facilities in this example are shown on the same base map as used for collecting data.

Impacts are inventoried by phase: exploration, rapid development, production, and decline and abandonment; and mapped. *Figure 25* shows several of the probable impacts of the proposed action: pipeline network, growth patterns, economic development, and refinery location. Other maps may show alternatives to the proposed action which may lesson or mitigate potential impacts.

The section on assessing impacts discusses in concise terms the elements of economic assessment: social services, physical services, and the cost of impact mitigation. The suggested technique of assessment is a simple weighted matrix to record and measure impacts. The report concludes with a demonstration of the importance of public participation in the resource management and OCS development process.

The concepts of the Louisiana *Process* are simple and direct. A complete understanding of potential development and impacts would require more detailed analysis. The strength of the Louisiana report—which all other States and regions might emulate—is the clear illustration of present features and resources, and what the impacts of OCS development might be.

Figure 25: OCS Impact: Example [Louisiana]



Source: *A Process for Coastal Resource Management and Impact Assessment*

5.4 *Management of OCS-Related Industrial Development* [Alaska]

This is the only study which stresses the mitigation of adverse impacts, and calls for preventive planning, impact assessment, and a clear understanding of what the community wants to be and achieve. Some of the ideas are Alaska-specific, but most may be adapted to communities in frontier areas elsewhere.

Source: Department of Community and Regional Affairs, Division of Community Planning, State of Alaska, prepared by David M. Dornbusch and Company, Inc. (San Francisco), December 1976. David Dornbusch was the project director.

Obtain From: Division of Community Planning, Pouch B, Juneau, Alaska 99811

Audience: Elected and appointed officials and local planners of Alaska communities, with the objectives designed:

1) To assist communities in anticipating, planning for and managing the onshore industrial development associated with OCS development;
2) To provide information on the types of onshore support facilities that will be required and the implications for the community; and
3) To define the role that the State government will play in setting policy and helping to manage developments.

This guide is well-written and fairly easy to use. While it is Alaska-specific, there are portions such as that on organization for management and growth implications which are universal. The entire report is predicated on the fact that Alaska has accepted OCS resource development as a given. The philosophy of the guide is then to minimize the damage that can be done, by regulation and control of the development activities before they begin.

Outline: There is little information on environmental and social impacts; most of the emphasis is on participant and jurisdictional actions, timing, priorities and planning. The priorities for community action, which form the heart of the report, are:

1) Determine what to expect from OCS developments,
2) Evaluate community ability to serve industry needs,
3) Determine what the community wants,
4) Examine and revise local zoning and other regulations,
5) Annex or acquire land to extend jurisdiction
6) Develop a financial plan, and
7) Establish procedures for reviewing development proposals.

These actions are described in more detail in Part I (38 pages). Each task is essential. The most likely OCS activities are service bases, platform installation, pipelines, oil and gas separation, and storage and transhipment. Service base requirements are detailed in the earlier Alaska report: *Marine Service Bases for Offshore Oil Development,* by Alaska Consultants, Inc., for the Department of Community and Regional Affairs, 1976 *(Section 5.6 #2).*

The three major management tools available to local communities are: public powers, such as permits and regulations; leases of public lands; and "indirect" tools, such as timing of approvals—all discussed in Part II. Part III applies these management tools to special objectives. The primary concerns are:

- Fiscal—financial planning, analysis, and budgeting; financial sources of assistance; and providing services and utilities, considering demand, growth implications and timing (with a checklist for reviewing new town proposals).
- Environmental—participants in the environmental management process; timing and priority of actions; and potential local actions.
- Special Concerns—including local hire, facility reuse and conversion, quality control and development guarantees, managing land in varied ownership, transportation, and stabilizing land values.

5.5 *The Harris Multi-Regional, Multi-Industry Forecasting Model*

The Harris Model was developed by Curtis Harris of the University of Maryland. It makes use of input/output relationships to reflect linkages among industries within a region, but is not a full input/output model. This model is a series of equations which takes base information and assumptions about supply, transport rates, and demand, to make predictions of economic variables: employment, population, income, and labor force.

The Harris Model is used in conjunction with a national input/output model developed by Clopper Almon, Jr., of the University of Maryland. The Harris regional forecasts are controlled to the Almon model for consistency between regional and national forecasts.

A major use of the Harris model has been for economic and fiscal projection purposes in Environmental Statements on OCS lease sales prepared by the Bureau of Land Management. The Harris model should be understood, however, if States and local governments are to review, comment upon, or compare their results to the BLM Environmental Statements. Examples of use of the Harris model, and a description of the methodology are provided in:

Technical Paper Number 1: Economic Study of the Possible Impacts of a Potential Baltimore Canyon Sale. Bureau of Land Management, New York Outer Continental Shelf Office, December 1975. 265 pages; $5.50 paper, $2.25 microfilm, NTIS No. PB249-365 IAS. Obtain from: National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161.

The Harris model is an excellent one in many ways, and is undoubtedly the most sophisticated and comprehensive model for producing regional projections and impacts, according to the WESTON Report. Further, BLM has now used it to make projections for virtually every state and county to be affected by OCS activity. The Texas study considers the model to produce consistent results in two

senses. First, national control totals can be established to assure that regional forecasts are not independent of national trends. Second, the model allows for consistent analysis among regions.

There are, however, some reservations about the model which must be considered by any potential user of the model or its results. In order to understand the detailed workings of the Harris model, the user must absorb the contents of three highly technical volumes. The model may lose some of its usefulness for certain small regions, because of the controlling assumptions. Further, many of the data values are estimates, or are based on a limited experience.

The Harris model is described in two methodologies included above:

TEXAS—*Offshore Oil: Its Impact on Texas Communities;* Volume IV, Appendix G (pages G-2 to G-3); and also in *Survey of Selected Modeling Techniques (See Annotated Bibliography, Section 5.6 #5).* One page general description.

WESTON—*A Method for Assessing the Onshore Impact of OCS Activity:* Volume II, Chapter 3—Economic Analysis, pages 3.6-2 through 3.6-6. More detailed six-page description, including simplified flow chart of the economic model, and discussion of reservations about the model.

Harris presents the model himself in:

The Urban Economies, 1985, Curtis Harris, Lexington, Massachusetts: D.C. Health & Co., 1973.

The Almon national input/output model is presented in:

Interindustry Forecasts of the American Economy, Clopper Almon, Jr., Lexington, Massachusetts: D.C. Health & Co., 1974.

The public sector of the Harris model produces fiscal impact projections which may be purchased along with the economic projections. The model simulates the structure of revenue systems and generates demands for public services. Revenue-expenditure systems are then constrained by a simulated political process. The lowest level of projection is the county.

PART THREE

5.6 *Annotated Bibliography*

The following are additional studies and reports which consider, identify and describe, or use planning and impact methods for OCS-related or more general industrial development. They are useful as references for a variety of specific subjects and geographic areas.

#1 *Source Book: Onshore Impacts of OCS Oil and Gas Development,* edited by David C. Williams and Jeffrey Zinn, The Conservation Foundation, prepared for the American Society of Planning Officials, funded by RALI Program of U.S. Geological Survey and Office of Research and Development, U.S. Environmental Protection Agency. January 1977; 180 pp. No Charge.
Obtain from: American Society of Planning Officials
1313 East 60th Street
Chicago, Illinois 60637

This was prepared as a supplement to a series of workshops for State and local planners on the potential onshore impacts of oil and gas development on the outer continental shelf. It is a structured guide to offshore oil and gas resources and extraction processes; offshore activities and related onshore facilities; onshore impacts of OCS oil and gas development; and planning and management techniques available to States and communities. Sources provided include books, reports, periodicals, and audiovisual information. State, Federal, and regional agencies involved in OCS development and related planning are also listed, as are energy industry and public interest groups.

#2 *Marine Service Bases for Offshore Oil Development.* Alaska Consultants, Inc. for the Division of Community Planning, Department of Community and Regional Affairs, State of Alaska, July 1976. The project director was Thomas J. Smythe. 87 pp.; no charge.
Obtain from: Division of Community Planning
Alaska Department of Community and Regional Affairs
Pouch B
Juneau, Alaska 99801
or
Alaska Consultants, Inc.
704 West Second Avenue
Suite "A"
Anchorage, Alaska 99501

Describes the types of service bases that have served the needs of the offshore oil industry in settings similar to the Gulf of Alaska and have created minimal economic, social, and environmental disruptions. Topics covered include location, materials and services, base facilities and land and labor. Experiences in the North Sea are liberally cited.

#3 *Offshore Oil and Gas Development: Southern California.* OCS Project Task Force, Office of Planning and Research, prepared for the California Coastal Commission, October 1977. Richard Hammond was project director and Suzanne Reed was project manager. Volumes 1 and 2, $2.10 per set.
Obtain from: General Services
Publications Section
P.O. Box 1015
North Highlands, California 95660

This report, presented in two massive volumes, uses a comprehensive methodology which may prove difficult for other States to follow. In addition, the unique conditions of California may make the methodology site specific. Subjects of interest are the management of OCS development and the adequacy of information (relating to the federal role); air quality (which is not well covered in other methodologies); and oil spills, which are also overlooked.

To aid in the use of the volumes, each subject is covered in a brief introduction and restated in the summary; they are then presented in the complete findings and recommendations and finally in detailed background papers.

#4 *Identification and Analysis of Mid Atlantic Onshore OCS Impacts.* Resources Planning Associates Inc. for the Middle Atlantic Governors' Coastal Resources Council, 1976. Approximately 150 pp.; no charge.
Obtain from: Department of Energy
Office of Siting
Room 6147, Federal Building
12th and Pennsylvania Avenue, N.W.
Washington, D.C. 20461

This publication assesses the methodologies, assumptions and analyses of economic, social, land vs. air quality, water quality and fiscal factors of six reports done on the Mid-Atlantic between 1974 and 1976. These reports include:

- Two socioeconomic and environmental inventories done for the Bureau of Land Management by The Research Institute of the Gulf of Maine, and by the College of Marine Studies, University of Delaware.
- The landmark Council on Environmental Quality (CEO) study, *Oil and Gas—An Environmental Assessment,* by Resource Planning Associates, 1974.
- The *Mid-Atlantic Regional Study* done for the American Petroleum Institute (API) by Woodward-Clyde Consultants, October 1975.
- BLM's *Draft Environmental Statement for Lease Sale No. 40,* and *Technical Paper Number 1: Economic Study of the Possible Impacts of a Potential Baltimore Canyon Sale,* December 1975.
- The Braddock, Dunn and McDonald (now BDM Corporation) study of *New Use Demands on the Coastal Zone and Offshore Areas of New Jersey and Delaware.* for the Congressional Office of Technology Assessment (OTA), 1976.

#5 *A Survey of Selected Modeling Techniques.* Research and Planning Consultants for the Coastal Management Program, General Land Office of Texas. May 1976. 19 pp.; no charge.
Obtain from: Research and Planning Consultants
314 West 11th Street
Austin, Texas 78701

Document briefly describes a number of modeling techniques having application for coastal-related topics. Models are described under the following categories: regional economic models, input/output models, environmental impact identification models, infrastructure cost models, estuary water quality models, ecologic models, outfall models, spill models and groundwater models. Major features of each technique are described in a few paragraphs, and examples of applications are cited.

This survey is included in the Texas Methodology—*Offshore Oil: Its Impact on Texas Communities,* as Appendix G in Volume IV. *(See Section 5.2).*

#6 *The Fiscal Impact Handbook.* Robert W. Burchell, and David Listokin. Subtitle: Estimating local costs and revenues of land development. Brunswick, New Jersey: Center for Urban Policy Research, Rutgers—The State University of New Jersey, 1978. 480 pp.; $15.00.
Obtain from: Center for Urban Policy Research
P.O. Box 38
New Brunswick, New Jersey 08903

This is a major handbook on fiscal impact analysis funded by the Department of Housing and Urban Development. It presents definitions, concepts, and reasons for analysis. It presents six methods of calculating costs: per capita multiplier, case study, service standard, comparable city, proportional valuation, and employment anticipation — and reasons for choosing each. Also presents chapters on revenue forecasting, legal considerations, obtaining data, and twelve computer models for fiscal impact analysis.

#7 "State and Local Fiscal Impacts of OCS Activity." David C. Williams, in *Coastal Zone '78,* Volume 1 (pp. 414-433)
Obtain from: American Society of Civil Engineers
345 East 47th Street
New York, New York 10017

This is a paper which was presented at the Coastal Zone '78 Symposium in San Francisco, March 14-16, 1978. Comprehensive surveys are discussed which cover the need for fiscal impact analysis, fiscal impact studies to date, key issues of fiscal impacts and available responses. The conclusion contains a section on preparing a fiscal impact analysis.

#8 *Managing Oil and Gas Activities in Coastal Environments.* By W.L. Longly, R. Jackson, and B. Snyder (RPC, Inc.) for the Office of Biological Services, U.S. Fish and Wildlife Service, FWS/OBS 78/54, June 1978 (66 pages).
Obtain from: Information Transfer Specialist
National Coastal Ecosystem Team, USFWS
National Space and Technology Laboratories
NSTL Station, MS 39529

Presents general information, based on observation and experience, on the environmental effects of petroleum development activities upon coastal wetlands. It is a summary of the comprehensive technical report, *The Development of Methods and Standards of Operation to Protect Fish and Wildlife Resources and Supporting Habitats of Coastal Wildlife Refuges During Oil and Gas Development,* which was also developed by RPC, Inc.

Chapter 6: Decisions and Opportunities to Influence Offshore and Onshore Developments Related To OCS

Assessing and planning for the onshore impacts of offshore oil development is not easy. The location and extent of economically recoverable reserves, and the required number of onshore facilities, will not be known until after discoveries are made. For most OCS lease areas, there are a number of potential onshore sites for facilities. Decisions about siting and construction are dependent upon a complex array of industry economic and public planning criteria. *To be prepared to influence siting decisions and manage impacts, States and communities will have to plan in advance for events that may never occur, creating . . . plans to be used when proposals are made for onshore facilities.*[7]

States and local governments can, however, help shape events. They may (1) influence Federal decisions, and (2) adopt planning and development controls. Opportunities for States and local governments to influence decisions that affect them in the OCS process have improved dramatically in the past three years. In November 1975, the Interior Department began modifying regulations which govern OCS lessees in order to provide coastal States with greater opportunities to review and influence OCS-related decisions. Also, the Secretary of Interior subsequently issued new regulations to provide more information in the lessee's Environmental Reports, and to make increased information available for State and local review of OCS exploration and development plans. The information requirements placed on OCS lessees have been fully coordinated with the Office of Coastal Zone Management to assure compatibility with CZM regulations.

In 1976, the Congress focused the consistency provisions of the Coastal Zone Management Act specifically on OCS exploration and development plans, and created the Coastal Energy Impact Program (CEIP). Then in September 1978, the Amendments to the Outer Continental Shelf Lands Act (referred to as "Amendments") added provisions for State input in preparing the leasing program, and increased informatioe for States and local governments at the exploration and development stages.

In this chapter, we elaborate upon the key decisions in the OCS process that were outlined in *Chapter 1*, specifically *Figure 2*, and the opportunities which States (and local governments) have to participate in, and benefit from, these decisions.

6.1 *OCS Processes and Effects*

Tracts on the nation's Outer Continental Shelf (OCS) are being leased by the custodian of Federal lands, the U.S. Department of the Interior (DOI).[8] The current OCS program—accelerated following the 1973 energy crisis—calls for the leasing of 27 areas between 1974 and 1981. As of the summer of 1978, 10 lease sales had been held, with 16 scheduled—as shown in *Figure 26*. Exactly how much oil and gas is on the OCS, and thus the resulting impacts, cannot be determined until discoveries are actually made. However, the ensuing intensive exploration and, if sucessful, development and production of offshore petroleum resources is likely to affect, in one way or another, most of the States and a number of communities along the Atlantic (with 7 sales), Gulf of Mexico (10 sales)[9], Pacific (3 sales), and Alaska (7 sales) coasts. It is clear though that the scope and impact of OCS activity will vary from region to region.

The five phases of OCS oil and gas development—which may cover a period of 15 to 40 years—are: (1) leasing (up to the sale), (2) exploration, (3) development, (4) production, and (5) shutdown. The time, industry activities, Federal government activities, State and local government activities, and onshore facilities of each phase are summarized in *Figure 27*. While there will be considerable overlap among these phases, the greatest amount of offshore activity, and thus the greatest potential for onshore impacts, is during the development phase.

6.2 *Federal Authority and Organization*

The Outer Continental Shelf Lands Act of 1953[10] established Federal jurisdiction over the OCS, and provided the basic statutory framework for Federal regulation of OCS oil and gas development in the Department of the Interior. The Bureau of Land Management (BLM) is the lead agency in developing leasing programs and granting mineral rights to offshore tracts and approving common carrier pipeline rights-of-way. The U.S. Geological Survey oversees lease development—regulation, supervision, inspection, and collection of royalties—after the leases are signed. The Office of OCS Program Coordination prepares the OCS Planning Schedules. Other Federal regulatory agencies involved in OCS-related matters are identified in *Figure 27*.

Figure 26: OCS Planning Schedule

Location	Sale #	Call for Nominations	Draft ES	Sale	First Exploration Plan Approval	First Dev/Prod Plan Approval (3)
North Atlantic	42	6/75	10/76	(1)	(2)	–
North Atlantic	52	(4)	(4)	(4)	–	–
Mid Atlantic	40	3/75	12/75	8/76	11/77	–
Mid Atlantic	49	11/76	5/78	2/79	–	–
Mid Atlantic	59	**9/79**	**10/80**	**8/81**	–	–
South Atlantic (Ga. Emb.)	43	9/75	2/77	3/78	–	–
South Atlantic	56	**3/79**	**6/80**	**4/81**	–	–
Eastern Gulf of Mexico	65	5/77	1/78	10/78	–	–
Gulf of Mexico (General)	41	12/74	8/75	2/76	3/76	5/76
Gulf of Mexico (Drainage)	44	—	6/76	11/76	1/77	7/77
Gulf of Mexico (Deep	47	3/76	11/76	4/76	6/77	9/77
Gulf of Mexico	45	—	4/77	4/78	–	–
Gulf of Mexico	51	2/77	2/78	12/78	–	–
Fulf of Mexico	58	10/77	9/78	**7/79**	–	
Gulf of Mexico	58A	10/77	6/78	**11/79**	–	–
Gulf of Mexico	62	9/78	**10/79**	**8/80**	–	–
Gulf of Mexico	66	**11/79**	**11/80**	**9/81**	–	–
Southern California	35	2/74	2/75	12/75	6/76	–
Southern California	48	7/76	8/78	**6/79**	–	–
Cent. & North. Calif.	53	11/77	**4/80**	**2/81**	–	–
Alaska:						
Eastern Gulf of Alaska	39	11/74	6/75	4/76	8/76	–
Cook Inlet	CI	9/75	7/76	10/77	5/78	–
Federal/State Beaufort Sea	–	2/78	**8/79**	**12/79**	–	–
Gulf of Alaska	55	5/78	**8/79**	**6/80**	–	–
Kodiak	46	10/75	**12/79**	**10/80**	–	–
Cook Inlet	60	12/78	**2/80**	**3/81**	–	–
Bering-Norton	57	4/79	**12/80**	**12/81**	–	–

Dates in roman type have already occurred. ***Dates in BOLD are scheduled by BLM*** but are subject to revision. (1) Postponed by litigation; sale tentatively rescheduled for October 1979. (2) Dashes (—) indicate dates are not projected. (3) The need for development/production plans depends on discovery of commercially recoverable hydrocarbons. (4) Rescheduling of sale being reconsidered for 1982 in order to provide for a 3-year period between North Atlantic sales.

Source: Office of OCS Program Coordination, Department of the Interior.

The Department of Energy participates in the development of the OCS leasing program by setting production goals.

Federal authority and organization (as of 1976) are described in more detail in:

CF: Volume IV: *Regulatory Framework for Protecting Living Resources*, Part 2—OCS Oil and Gas.

Department of the Interior OCS Regulations

The Secretary of the Interior has already used his authority under the OCS Lands Act to issue, on January 27, 1978,[11] three sets of regulations which provide timely information and assistance in order to plan for onshore impacts; and provide States (and through States, local governments) the opportunity to participate in policy and planning decisions:

30 CFR 250 (Section 250.34—Exploration, Development and Production Plans) U.S. Geological Survey

30 CFR 252 (New Part—OCS Oil and Gas Information Program), USGS; and

43 CFR 3300 (Section 3301.8—Oil and Gas Information), Bureau of Land Management

Within the Department of the Interior, Secretarial Order 2974 (Revised) calls for cooperation among BLM, USGS, the National Park Service, Heritage Conservation and Recreation Service and the U.S. Fish and Wildlife Service. The Secretary's Office of OCS Program Coordination focuses on the policy and coordination aspects of all OCS activities—coordinating efforts under Secretarial Order 2974, coordinating the Department's responsibilities with other Federal agencies and providing information to other Federal agencies, States and local governments on both the OCS process and leasing schedule.

OCS Lands Act Amendments of 1978

Some of the most significant changes in OCS policy and process come through the recently adopted Amendments to the OCS Lands Act. Introduced as S.9, the Amendments are fully reported in Conference Report No. 95-1474, dated August 10, 1978, as submitted by Congressman Murphy of New York. The Act was signed by the President on September 18, 1978 and became Public Law 95-372.

Areas of concern to States and local governments are discussed below under "Key Decisions in the OCS Process" and "OCS Oil and Gas Information Program." In addition, the Amendments modified the bidding and leasing administration, added safety requirements, clarified legal procedures for citizens and courts, established an "offshore oil spill pollution fund" and a "fishermen's contingency fund," and amended the allocation of CEIP funds. Provisions for providing information to States and local governments, and involving them in OCS decisions give legislative endorsement to the Secretary's regulations.

6.3 *Key Decisions in the OCS Process*[12]

Of high concern to both State and local governments are the points at which they can obtain information on the OCS process, provide information to the Federal government, review and comment on Federal reports and plans, give (or not give) permits for OCS-related onshore and territorial sea facilities, and otherwise influence the scale, timing, location, and impact of OCS development. The key points in the Federal process, identified earlier in *Figure 2*, are: the Preparation for Leasing, the Environmental Statement on the lease sale, the BLM Environmental Studies Program, review and comment on the Exploration Plan (and its Environmental Report), the Transportation Management Plan, and the Development and Production Plan (and its Environmental Report).

Preparation for Leasing [Decisions 1 through 8 in *Figure 2*] States, local governments and other interested parties have previously been provided the opportunity to submit either positive or negative nominations on tracts proposed for leasing. The Amendments provide for even earlier State involvement:

- In drawing up the required five-year leasing program, the Secretary must consider the "laws, goals, and policies of affected States which have been specifically identified by the Governors of such States as relevant matters. . ." (Section 18 (a)(1)(F))
- The Secretary must solicit suggestions from the Governors on the leasing program (18 (c)(1)) and submit the program to Governors (and through Governors to local governments, on request) for comment (18(c)(2))
- Under Section 19, Coordination and Consultation with Affected States and Local Governments, "any governor of any affected State or the executive of any affected local government in such State may submit recommendations to the Secretary regarding the size, timing, or location of a proposed lease sale or with respect to a proposed development and production plan."
- The Secretary may enter into cooperative agreements with affected States for joint study, sharing of information, planning, and monitoring (19(e))

The Department of the Interior—through BLM and the Office of OCS Program Coordination—is implementing these Amendments by developing a proposed five year leasing program, including a revised planning schedule. State and local involvement (local must be through the States) is scheduled as follows:

1) Request for comments and information on potential leasing areas, including State CZM programs, October 24, 1978
2) Response to request, December 1, 1978
3) Draft proposed leasing program sent to Governors of affected States for comment, March 2, 1979
4) Responses from Governors on draft, April 17, 1979
5) Publication of proposed program in *Federal Register* and transmittal to Governors,June 5, 1979
6) Comments from Governors, September 4, 1979
7) Submission of final leasing program to the President and Congress, November 9, 1979
8) Approval of final program by Secretary of the Interior and *Federal Register* publication, January 15, 1980

For more information, contact Carolita Kallaur, Office of OCS Program Coordination, Room 5152, Department of the Interior, Washington, D.C. 20240, phone (202) 343-9314.

Much of the information States would need for suggestions, recommendations, and comments could come from general level OCS development scenarios and State wide estimates of socioeconomic impact, as identified in *Figure 2*.

Environmental Statement on Leasing [Decisions 4a and 4b]

The Environmental Statement (ES) on specific proposed lease sales has been the primary source of information on projected impacts of OCS activity. It has been the main study effort, to which both BLM and States have marshalled their forces. A major source of information for the ES is the BLM Environmental Studies Program (ESP), which has been the subject of several reports calling for improvements.[14]

The Bureau of Land Management responded to these calls by preparing a *Study Design for Resource Management Decisions: Oil and Gas Development and the Marine Environment* (Draft-May 15, 1978; Final-August 25, 1978). Under this *Study Design*, the Department would prepare regional study plans, covering all types of impacts and giving new emphasis to onshore and nearshore effects, as required by the January 1978 Interior regulations. States

Figure 27:

PHASES OF OCS OIL AND GAS ACTIVITY

The process of offshore oil and gas activity is commonly divided into five phases: (1) leasing, (2) exploration, (3) development, (4) production, and (5) shutdown. For a given petroleum field, the phases may encompass a period ranging from 15 to 40 years. Figure 2 showed the phases in the life of a hypothetical oil and/or gas field and illustrated the fact that these phases may overlap considerably. For example, exploration activities continue after development activities have begun, and production will begin before development is completed. Continuation beyond the exploration phase, however, is entirely dependent upon the discovery of economically recoverable reserves of oil or gas.

The five phases of OCS oil and gas activity are described below as they relate to time involved, industry activities, federal government activities, state and local activities and potential onshore facilities.

1. Leasing

Time:

Approximately 19 months from "call for nominations" to the actual lease sale: geophysical exploration (by industry) may have begun many years before.

Industry Activities:

Preparation of internal market and capability analyses; preliminary geophysical exploration (under permit from USGS); nomination of tracts for consideration in the lease sale; preliminary location analysis for staging areas; and possibly onshore site acquisition.

Federal Government Activities:

The leasing process, managed by the Bureau of Land Management (BLM), includes: environmental baseline studies; "call for nominations" by the oil and gas industry of tracts it believes hold the greatest promise for oil and gas; draft (DES) and final environmental statements (FES) prepared by BLM in cooperation with USGS and the Fish and Wildlife Service (FWS); these are submitted to the Council on Environmental Quality (CEQ) and made available to the public; a decision to lease is made by the Secretary of the Interior based on the FES and an internal decision document; at the lease sale itself tracts of the OCS are offered to the "highest responsible qualified bidder," with or without stipulations. Any bid may be rejected.

State and Local Activities:

Participation in the call for nominations, in which state and local governments—and citizens—may identify tracts which should not be considered for leasing ("negative nominations") or upon which special conditions should be imposed; participation in tract selection meetings and review and comment on draft environmental statements (DES). Planning may begin for siting and providing public services in future phases.

Onshore Facilities:

Geophysical and geological exploration vessels will use existing ports.

2. Exploration Phase

Time:

One to seven years from lease sale: an average of two years for discovery of economically recoverable oil or gas reserves and five years or more for identification of size and area of the find; up to five years until lease abandonment if no discovery is made.

Industry Activities:

Additional geophysical surveys to locate geological structures favorable for oil and gas; exploration plans submitted to USGS and "notices" of support activities submitted to appropriate Governors; exploratory drilling by drilling companies (under contract to the oil companies which lease tracts); if discovery is made, intense supplementary exploration, possibly for many years, to establish the area and size of the field, and to ensure that all possible geological structures containing oil and gas have been located; preparation of internal development projections, preliminary field development plans and financial estimates. If no commercial discovery is made, industry will abandon the lease and onshore service bases.

Federal Government Activities:

USGS supervises operations: reviews, accepts and approves exploration plans, issues drilling permits, monitors the drilling procedures; Environmental Protection Agency (EPA) issues pollution control permits; the Corps of Engineers (COE) and U.S. Coast Guard (USCG) regulate navigation.

State and Local Activities:

Assume regulatory and permitting authority over the siting and operation of service bases and portions of operations within the limits of state waters; plan for siting of potential onshore facilities if discovery is made, mitigating employment and environmental impacts, and for providing and financing public services. (May be involved in planning and permits for anticipatory siting—see below).

Source: "Anticipating and Planning for the Impacts of OCS Oil and Gas Development," Introduction to the Source Book: Onshore Impacts of Outer Continental Shelf Oil and Gas Development (See Section 5.6 #1). The Conservation Foundation, David C. Williams and Jeffrey A. Zinn, 1977.

Figure 27 (continued)

Onshore Facilities:

Temporary service bases are established, generally located in existing developed harbors, with associated repair and maintenance yards and general shore support (heliports may be established at existing airports); as a rule no new facilities are constructed but industry may anticipate discovery and plan for and option land for permanent service bases; options for pipe coating yards and platform fabrication yards may also be taken; state and local government may be involved in permits for these facilities.

3. Development Phase

Time:

Four to nine years—starting with the discovery of economically recoverable resources and extending through initial pipeline installation or tanker operations.

Industry Activities:

Application to USGS and COE for development drilling permits; Field Development Plans submitted to adjacent states; development drilling and production platforms put in place.

Federal Government Activity:

USGS reviews and approves field development plans, and issues permits for development drilling and OCS gathering lines; COE issues permits for drilling structures and pipelines in navigable waters; BLM issues permits for pipeline rights-of-way on the OCS; the Office of Pipeline Safety (DOT), Federal Power Commission (FPC) and Interstate Commerce Commission (ICC) are involved in regulation of common carrier pipelines. EPA and the Occupational Safety and Health Administration (OSHA) issue permits and regulate operating activities.

State and Local Activities:

Issue permits for nearshore and onshore pipeline rights-of-way, land use, and construction of onshore and nearshore facilities; regulate water and other resource uses, hazards to the environment, and other activities; plan siting of service bases and other onshore facilities listed below (service bases generally are not federally regulated); provide public services for employees and induced population, many of them at a temporarily high level for the relatively short-term development phase.

Onshore Facilities:

Permanent service bases
Repair and maintenance yards
General shore support
Platform fabrication yards
Platform installation service bases
Pipelines and landfalls
Pipeline installation service bases
Pipe coating yards
Partial processing plants
Gas processing and treatment plants
Marine terminals

Essentially all major facilities for the production phase are installed during the development phase.

4. Production Phase

Time:

Ten to 25 or more years—from first petroleum landing onshore to field shutdown.

Industry Activities:

Operation of facilities constructed during the development phase; activities to maintain and improve the rate and volume of production: construction of additional production platforms, new wells and well "workover," additional pipelines, storage facilities; and regular servicing of wells and platforms.

Federal Government Activities:

Monitoring and regulating of routine operations, by USGS, COE, USCG, EPA, BLM, OSHA, FPC, DOT and ICC, and others; respond to oil spills; possible additional leasing.

State and Local Activities:

Provision of public services for onshore facilities and added population; monitoring onshore petroleum operations; anticipation of employment decline during production phase and eventual shutdown.

Onshore Facilities:

Additional pipelines (see Development Phase)

5. Shutdown Phase

Time:

One to three years from end of production phase; representative cumulative time from lease sale—25 years.

Industry Activities:

Dismantling offshore facilities and sealing all wells with cement 15 feet below the surface of the seabed; closing or reducing onshore facilities as production ceases.

Federal Government Activities:

Monitoring and enforcing abandonment regulations, by USGS.

State and Local Activities:

Mitigating past impacts, covering the loss of accustomed revenues, and efforts to maintain the economic base.

Onshore Facilities:

Facilities identified above are closed or shifted to other uses.

Note: Some of the information on "Federal Government Activities" has been changed since this was published in January 1976. *(See Section 6.2.)*

would be involved in establishing the regional study plans and have significant effect in determining their information needs. The first general level of the Planning and Impact Methodologies might be used by States to determine those information needs. Upon completion of the Draft ES, a more detailed (medium level) effort may be used to evaluate the Bureau's estimates of OCS activity and effect.

The OCS Lands Act Amendments support these changes by calling for a new Environmental Studies format (Section 20), including predicting the "impacts of development offshore on the affected and coastal areas." States and local governments can become more involved than previously because the Amendments (20(c)) require the Secretary to "plan and carry out [environmental studies] in full cooperation with affected States." States and local governments may provide information during the course of the studies, and not just respond to an Environmental Statement, although of course that opportunity still exists.

Finally, the Amendments require a long-term monitoring effort after the leases are sold to determine any significant changes in the environment.

Exploration Plan Evaluation and Drilling Permit Approval (Decision 10)

The Exploration Plan is a technical document which must be submitted by lease operators before they begin exploration. Upon approval of the Plan, USGS will issue the appropriate approvals and exploration permits. The Amendments require the plan to include:

> "(A) a schedule of anticipated exploration activities to be undertaken;
> (B) a description of equipment to be used for such activities;
> (C) the general location of each well to be drilled; and
> (D) such other information deemed pertinent by the Secretary."[See Section 11 (c)(3)]

In his January 1978 regulations (30 CFR 250), the Secretary requires that the operator now submit an Environmental Report (not an ES) on the Plan which includes several elements key to planning for onshore impacts:

> *(iv) the location, size, and number of onshore support and storage facilities, their land requirements and related rights-of-way and easements. . .including where possible a timetable. . .;*
> *(v) an estimate of the number of persons expected to be employed in support of offshore, onshore, and transportation. . .;*
> [250.34-3(2)(I)]

plus information on travel routes, solid and liquid wastes and pollutants, demand for resources, and an assessment of environmental impacts both offshore and on. A key part of the ER is the demand for: *copies of all consistency certificates provided to affected States with approved coastal zone management programs.* Copies of the Exploration Plan and its Environmental Report are transmitted by the USGS Area Supervisor to the Governor and Coastal Zone Management Agency of each affected State, and made available to the public. In his evaluation of the Plan, the USGS Supervisor must consider comments received from the Governors of affected States.

Transportation Management Plan Approval [Decision 11]

The transportation of oil and gas ashore, especially through pipelines, requires a partnership between Federal agencies and State governments. BLM has established a program of Regional Working Groups in each leasing area (seven nationwide) composed of representatives of States within the region, Federal agencies, multi-State regional agencies having Federal/State charters, and industry. The tasks of the working groups will be to identify information needs, design studies and develop Regional Transportation Management Plans (TMP) in anticipation of decision points in the OCS program.

The program in each region will be completed in four phases: (I) prelease sale coordination, and identification of potential regional transportation routes and issues; (II) Regional Management Studies Plan and implementation; (III) Site-Specific Management Studies Plan and Implementation; and (IV) Regional Transportation Management Plan (III and IV are contingent upon the discovery of marketable reserves). The major elements of a Regional Transportation Plan are:

- *Analysis and recommendation for discrete corridors and alternatives for environmentally sound pipeline management;*
- *identification of environmentally sound alternative locations of onshore facilities;*
- *identification of feasible and optimal transportation modes and mixes;*
- *identification of the appropriate use restrictions and mitigating measures for use by BLM, USGS, States, and other regulatory agencies; and*
- *a plan for monitoring of construction and operations and any follow-up studies which may be required.*

Regional subgroups called State Working Groups will be established in States with a high probability of oil and gas landings. The approach to the studies, scope of planning effort, organizational structure, and a schedule of the planning process are presented in "Intergovernmental Planning Program for OCS Oil and Gas Leasing, Transportation and Related Facilities," February 8, 1979. Obtain copies from Bert Rogers, BLM, Department of the Interior, Washington, D.C. 20240 or Superintendent of Documents, Washington, D.C. 20402 (Stock No. 024-011-00101-8).

Development and Production Plan Evaluation and Approval [Decision 12]

OCS lease operators must submit a Development and Production Plan to USGS before beginning development of the field. These plans are highly technical documents which describe the proposed method of producing and transporting hydrocarbons. Under the Amendments, the Plan must include:

a description of all facilities and operations located on the Outer Continental Shelf which are proposed by the lessee or known by him (whether or not owned or operated by such lessee) to be directly related to the proposed development, including the location and size of such facilities and operations, and the land, labor, material, and energy requirements associated with such facilities and operations [25(c)(2)].

Further, under the Secretary's regulations each plan must be accompanied by an Environmental Report, submitted by the lessee, which includes, in part:

- the location, description, and size of onshore facilities;
- a transportation plan, covering routes and quantities;
- resource requirements, including the number and timing of employment and the approximate number of people and families to be added to the population of local near-shore areas as a result of the planned development;
- a time frame for development and production activities;
- information on the physical environment; and
- an assessment of impacts. [30 CFR 250.34-3(b)(1)]

At least once in every frontier region (except the Gulf of Mexico), the Secretary would have to declare a Plan a major Federal action and prepare the necessary Environmental Statement covering the cumulative effect of approved and potential Plans. The Plan (and the ES if required) would be submitted to the Governor of each affected State and, upon request, to the executive of any local government. Local comments must be submitted to the Secretary through the State's Governor.

Before approving a Development and Production Plan, the Secretary must be assured that the Plan is consistent with the State's approved coastal zone management program. Consistency with the adopted Transportation Management Plan is not required, but both BLM and USGS will take this plan into strong consideration.

6.4 *OCS Oil and Gas Information Program*

Under Section 26 of the Act, as amended in 1978, the Secretary is to obtain all information obtained or developed by OCS operators on their leases and prepare a Summary Report (and Index to Information) for submission to affected States and, upon request, local governments, which shall include:

> *estimates of (A) the oil and gas reserves in areas leased or to be leased, (B) the size and timing of development if and when oil or gas, or both, is found, (C) the location of pipelines, and (D) the general location and nature of onshore facilities.*

This language is reflected in more detail in the January 1978 regulations of the Secretary covering USGS (30 CFR 252.4) and BLM (30 CFR 3301.8). The regulations also require that the Directors of USGS and BLM make available to States and local governments, on a regular basis, an index of all relevant lease sale information.

6.5 *Coastal Zone Management Program*

OCS development and State coastal zone management programs are connected under two elements of the Coastal Zone Management Act (CZM Act) of 1972, as amended in 1976: the Federal consistency requirements of Section 307; and the Coastal Energy Impact Program (CEIP) of Section 308.

Federal Consistency with Coastal Zone Management

One of the most powerful requirements of the CZM Act is that Federally permitted activities in OCS exploration and development plans must be consistent with approved State Coastal Zone Management (CZM) programs. The implementing regulations, "Federal Consistency with Approved Coastal Management Programs" (15 CFR 930, dated March 13, 1978), elaborate on the CZM Act's statutory requirement that:

> *Each activity which is described in detail in an exploration, development or production plan for an area leased under the Outer Continental Shelf Lands Act, as amended, and which affects any land or water use in the coastal zone of a State with an approved CZM program, must comply with such State's approved management program and must be carried out in a manner consistent with such program.*

Furthermore, the CZM Act provides coastal States with the capability of preventing Federal agencies from issuing required licenses or permits for activities which they find to be inconsistent:

> *No Federal agency shall grant any license or permit for any activity described in detail in such plan until the State receives a copy of the plan and necessary supporting information and concurs that such activities comply with and are consistent with its CZM program or until concurrence is conclusively presumed after three or six months, as applicable.*

The *necessary supporting data and information* must include a brief assessment of the probable coastal zone effects, and a brief set of findings indicating that the proposed activities, their associated facilities, and their combined effects, are all consistent with the provisions of the management program. In addition, Interior Department regulations (30 CFR 250.34) require the applicant to submit an Environmental Report.

Upon receipt of the OCS plan and supporting information, the State must begin timely review, including public notice. At the earliest possible time, the State must noti-

fy the lessee and Interior whether it concurs with or objects to the consistency certification. Concurrence will be conclusively presumed at the end of three months unless the State issues an objection or requests up to three additional months for review. In most cases it can be expected that as a result of consultation among the State and Federal agencies and the OCS lessee (or operator), State concurrence will expeditiously occur followed by Interior approval of the OCS plan and Federal issuance of required permits.

If the State does not concur that the activities in the plans are consistent, there are a number of procedures available for resolution of the issue. Informal consultation with the applicant may lead to amendment of the plan to assure conformance to the CZM program. The applicant may file an appeal with the Secretary of Commerce, who may make a finding that the OCS activity is "consistent with the objectives or purposes of the Federal Coastal Zone Management Act or is necessary in the interest of the national security." (See 15 CFR 930.120-134). If such a finding is made, the Federal agency may then issue the permit(s) or license(s) in question. If the Secretary of Commerce does not make such a finding, the applicant must submit a new or amended OCS plan, along with a new consistency certificate and supporting information.

NOTE: The Federal consistency provisions of the Coastal Zone Management Act are discussed in the simplified guideline prepared by the Office of Coastal Zone Management: "Federal Consistency in a Nutshell," April 11, 1978. Obtain this guideline and a copy of 15 CFR 930 from OCZM, 3300 Whitehaven Street, N.W., Washington, D.C. 20235, phone (202) 634-4255.

Coastal Energy Impact Program (CEIP)

Under the same 1976 Amendments to the CZM Act, the Congress created the Coastal Energy Impact Program to provide assistance to States and local governments to plan for all types of energy development in the coastal zone; and to provide financial assistance to meet some of the public service, fiscal, and environmental needs resulting from OCS oil and gas activity. The details of this program are discussed in:

CF Methodology, Vol. IV—*Regulatory Framework*, p. 50
Texas Methodology, Vol. I—*Executive Summary*, pp. 33-37.
Source Book (See Section 5.6 #1), pp. 117-118.

CEIP assistance is allocated as follows:

1) Planning grants are available to coastal States and communities to do such activities as resource inventories, siting suitability studies, transportation and land use plans, and programs for the scheduling and financing of public facilities.
2) Credit assistance is available to the community in the form of direct loans or guarantees for the building of new public facilities, or rarely, for providing services for a short period of time.
3) Repayment assistance is also available to a local government that cannot meet its CEIP credit assistance obligations because revenues from coastal energy activities fail to materialize as expected.
4) Environmental grants are available to help prevent, reduce or repair damage to or loss of valuable environmental or recreational resources.

The assessment and planning methods described in this *Guide* may be used to provide the numbers required for allocation of CEIP funds. (NOTE: Sec. 308(c)(2) established by the OCS Lands Act Amendments of 1978, provides grants for State activities under the Act.) At the State level, results from the methods may be used to assure that the State allocates funds to local projects using sound estimates of the effects of OCS development and the need for public facilities and services.

6.6 *State and Local Powers Which Affect Onshore Development*

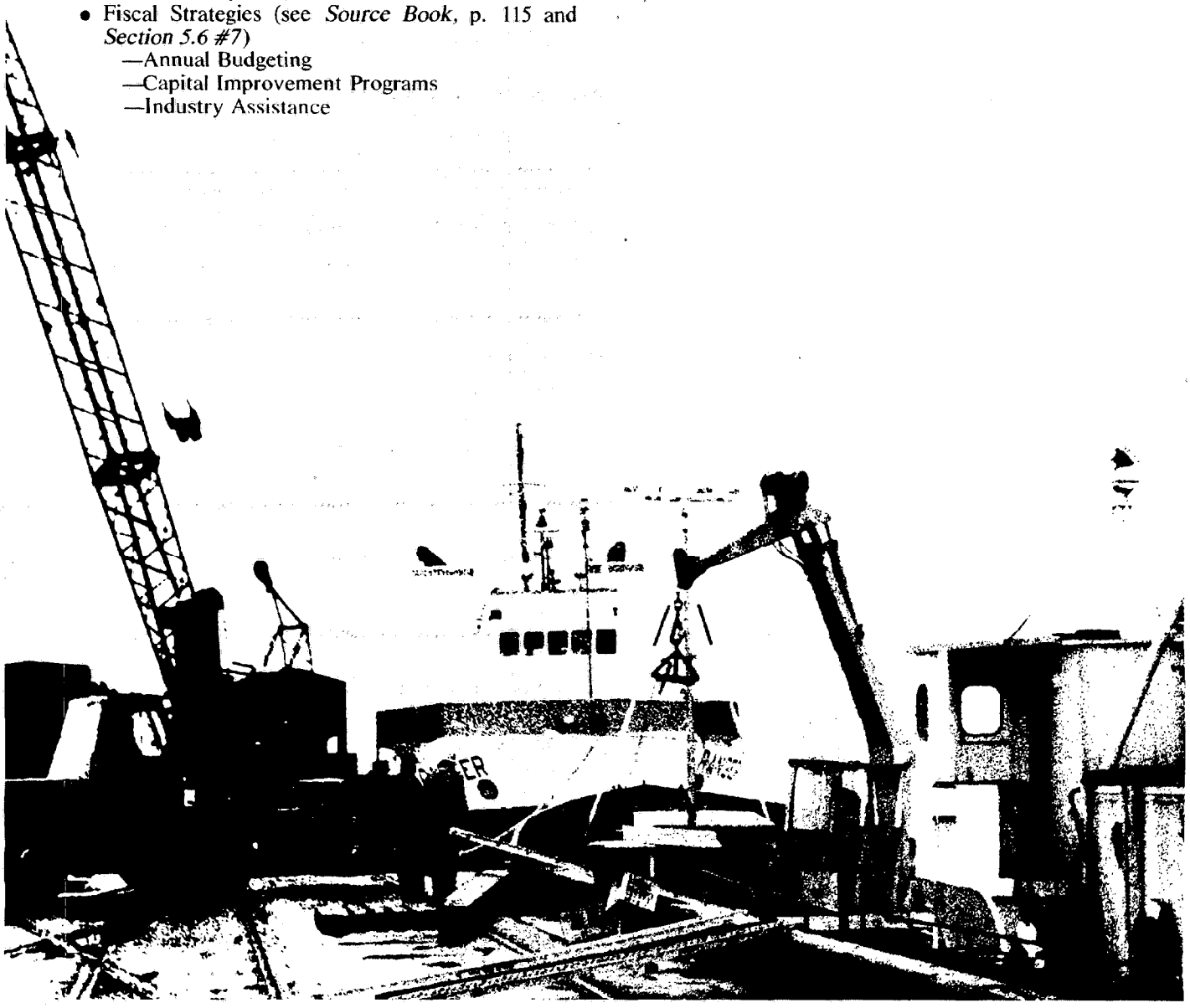
This *chapter* has described several points at which information generated through the assessment and planning methods may be used to affect Federal activities, studies, assessments, regulations, or granting of permits. Both States and local governments, however, can directly affect the timing, type, scale, and location of onshore facilities. The first step—a major part of the methods discussed in this Guide—should be *site suitability analysis*, which was covered in *Section 1.5*. In addition, there are a variety of State and local planning and control power available.

This *section* can only list a number of these powers and opportunities, and identify some of the sources of information which explain them. In addition to these, the reader is encouraged to turn to sources within the particular State(s) and local government(s) which are of concern.

The best discussion of available State powers is provided in the *Source Book* (see *Section 5.6 #1*), while a comprehensive and detailed analysis of local management tools is presented in Alaska's *Management of OCS-Related Industrial Development (see Section 5.4)*. The primary tools available include:

- State Planning and Development Controls (see *Source Book*, p. 95)
  - —Coastal Zone Management Program
  - —Energy Facility Siting Legislation
  - —State Environmental Controls, e.g., wetlands, critical areas, air

- Traditional Planning and Zoning (see Alaska, *Management of OCS-Related Industrial Development*, p. II-2)
  - —Zoning Regulations
  - —Conditional Use Permits and Procedures
  - —Site Plan Review Regulations and Procedures
  - —Planned Unit Development (PUD) Regulations
  - —Growth Phasing Regulations
  - —Subdivision Regulations
- Special OCS-Related Planning and Regulation
  - —Port and Harbors Management Strategy (see *Source Book*, p. 108)
  - —Waterfront Industrial District, e.g., New Bedford, Mass. zoning ordinance (see *Source Book*, p. 110)
  - —Planned Industrial District, e.g., Northampton County, Virginia zoning for proposed platform fabrication yard (see *Source Book*, p. 110)
- Fiscal Strategies (see *Source Book*, p. 115 and *Section 5.6 #7*)
  - —Annual Budgeting
  - —Capital Improvement Programs
  - —Industry Assistance



FOOTNOTES

1. *Methodologies for OCS-Related Facilities Planning*, New England River Basins Commission, March 1978.
2. Six workshops each in 1977 and 1978 on "Onshore Impacts of OCS Oil and Gas Development," conducted by the American Society of Planning Officials (ASPO), administered by the RALI Program, USGS, and funded by the Office of Research and Development, Environmental Protection Agency (EPA).
3. Methodology III is fully described by the authors in "Siting Outer Continental Shelf Related Onshore Facilities," by Philip A. Marcus and William E. Nothdurft, Volume I, pages 434-453, of *Coastal Zone '78*—Proceedings of the Coastal Zone '78 Symposium at San Francisco, California, March 14-16, 1978. Published by the American Society of Civil Engineers. *See Section 5.6 #7* for ordering.
4. The OBERS Project was a joint effort of the Office of Business Economics (OBE), now the BEA, and the Economic Research Service (ERS).
5. The methods and results are discussed in "Fiscal Impacts on Local Governments Due to OCS Development," Volume I, pages 279-283, *Coastal Zone '78*. See *Section 5.6 #7* for ordering.
6. Based on *A Procedure for Evaluating Environmental Impact*, a two-dimensional model prepared by L. Leonard et al, U.S. Geological Survey Circular 645, 1971. Available from USGS, National Center, Reston, Virginia 22092.
7. See Footnote 1.
8. Background materials on the Outer Continental Shelf, petroleum resources, and the Federal OCS leasing program are presented in:
   NERBC—Methodologies for OCS-Related Facilities Planning, Chapter I—"The OCS Planning Environment;" and
   CF: *Volume I—Recovery Technology*: Part I—"Resources and Recovery."
9. The Gulf of Mexico had at least 26 OCS sales between 1954 and 1975.
10. 43 U.S.C. 1331, et seq. (referred to as "Act")
11. *Federal Register*, Volume 43, Number 19.
12. Taken largely from the Bureau of Land Management (BLM) *Study Design for Resource Management Decisions: Oil and Gas Development and the Marine Environment*, August 25, 1978.
13. Regulations published October 26, 1978 in the *Federal Register*, 43 CFR 3300 (Section 3308— Leasing Program), BLM.
14. Two significant reports on the BLM Environmental Studies program are:
    State Information Needs Related to Onshore and Nearshore Effects of OCS Petroleum Development, joint report of Bureau of Land Management and Office of Coastal Zone Management, January 1977.
    OCS Oil and gas: An Assessment of the Department of the Interior Environmental Studies Program, National Academy of Sciences, 1978.

PHOTO CREDITS

Kathleen B. Hom – pp. 39, 65
David C. Williams – Cover, pp. 2, 10
Department of the Interior – p. 3

WHERE TO ORDER PRINCIPAL ASSESSMENT METHODS

NERBC: ONSHORE FACILITIES RELATED TO OFFSHORE OIL AND GAS DEVELOPMENT
By New England River Basins Commission, for Resource and Land Investigations (RALI) Program, U.S. Geological Survey, Department of the Interior

- *METHODOLOGIES FOR OCS-RELATED FACILITIES PLANNING* (Third Volume) 151 pages, March 1978
- *FACTBOOK* (First Volume) 750 pages, November 1976.
- *ESTIMATES FOR NEW ENGLAND* (Second Volume) 287 pages, November 1976.
- *CASE STUDIES IN OCS PLANNING* (Fourth Volume), 80 pages, July 1978.

Obtain from: Technical Information Officer—RALI Project
New England River Basins Commission
53 State Street
Boston, Massachusetts 02109

WESTON: METHODOLOGY FOR ASSESSING ONSHORE IMPACTS OF OFFSHORE OUTER CONTINENTAL SHELF OIL AND GAS DEVELOPMENT (All July 1978)
By Roy F. Weston, Inc., for National Science Foundation, Bureau of Land Management—Department of the Interior, and Office of Coastal Zone Management, National Oceanic and Atmospheric Administration—Department of Commerce.

- Volume I —*INTRODUCTION*, 50 pages.
- Volume II —*METHODOLOGY*, 732 pages.
- Volume III—*CASE STUDY*, 280 pages.

Obtain from: Vice President for Corporate Planning
Roy F. Weston, Inc.
Weston Way
West Chester, Pennsylvania 19380

CF: ENVIRONMENTAL PLANNING FOR OFFSHORE OIL (All March 1978)
By The Conservation Foundation, for the U.S. Fish and Wildlife Service—Department of the Interior

- Volume I —*RECOVERY TECHNOLOGY*, 226 pages [FWS/OBS-77/12]
- Volume II —*EFFECTS ON COASTAL COMMUNITIES*, 60 pages [FWS/OBS-77/13]
- Volume III—*EFFECTS ON LIVING RESOURCES AND HABITATS*, 220 pages [FWS/OBS-77/14]
- Volume IV—*REGULATORY FRAMEWORK FOR PROTECTING LIVING RESOURCES*, 126 pages [FWS/OBS-77/15]
- Volume VI—*REGIONAL STATUS REPORTS* [five separate documents]
  Part 1: *New England*, 67 pages [FWS/OBS-77/16.1]

Part 2: *Mid and South Atlantic,* 93 pages [FWS/OBS-77/16.2]
Part 3: *Gulf Coast,* 158 pages [FWS/OBS-77/16.3]
Part 4: *California.* 154 pages [FWS/OBS-77/16.4]
Part 5: *Alaska, Washington and Oregon,* 127 pages [FWS/OBS-77/16.5]

Obtain from: Information Transfer Specialist
National Coastal Ecosystems Team, Office of Biological Services
U.S. Fish and Wildlife Service, National Space Technology Lab
NSTL Station, Mississippi 39529

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GLOSSARY

In this *User's Guide,* the abbreviations NERBC, WESTON and CF are used to refer to the three principal assessment and planning methodologies:

NERBC	*Onshore Facilities Related to Offshore Oil and Gas Development,* prepared by the New England River Basins Commission
WESTON	*Methodology for Assessing Onshore Impacts of Offshore Outer Continental Shelf Oil and Gas Development,* prepared by Roy F. Weston, Inc.
CF	*Environmental Planning for Offshore Oil and Gas,* prepared by The Conservation Foundation

Other abbreviations used are:

BEA	Bureau of Economic Analysis, Department of Commerce
BLM	Bureau of Land Management, Department of the Interior
CEIP	Coastal Energy Impact Program
CZM	Coastal Zone Management
DOI	Department of the Interior
ES	Environmental Statement [sometimes with "Impact" as a middle word]
FWS	U.S. Fish and Wildlife Service, Department of the Interior
I/O	Input/Output [model]
NSF	National Science Foundation
OBERS	Projection method—see Footnote 4.
OCS	Outer Continental Shelf
OCZM	Office of Coastal Zone Management, National Oceanic and Atmospheric Administration (NOAA), Department of Commerce
OPA	Office of Policy Analysis, Assistant Secretary for Budget, Policy and Administration, Department of the Interior
RALI	Resource and Land Investigations Program, U.S. Geological Survey
SMSA	Standard Metropolitan Statistical Area
USGS	U.S. Geological Survey, Department of the Interior

MASTER INDEX

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